

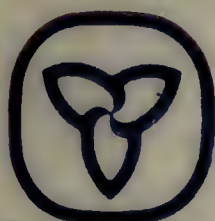
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The Ontario Economy 1987



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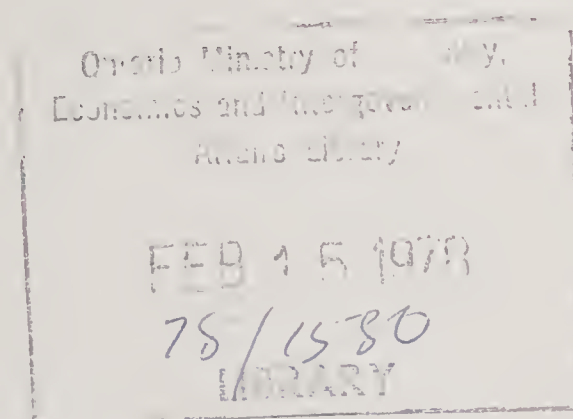
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The Ontario Economy 1978-1987

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Institute for Policy Analysis
University of Toronto



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PREFACE

This is an update of the study by D.K. Foot, J.E. Pesando, J.A. Sawyer, and J.W.L. Winder, *The Ontario Economy, 1977 - 1987* (Toronto: Ontario Economic Council, 1977). Changes in the short-run economic outlook and in the likely scenario of energy investments made it desirable to update the study. The reader should, however, refer to the original study for a full description of the methodology used.

As in the previous study, the projections were done at the Institute for Policy Analysis of the University of Toronto using the TRACE econometric model of the Canadian economy and various satellite models developed at the Institute and described in the earlier study. Computations were done using the facilities of the University of Toronto Computer Centre.

The authors would like to thank Les Cseh and George Ugray for programming assistance, Gerry Wall for research assistance, and Ann Jones and Lorelle Triolo for secretarial assistance. David Foot and an anonymous reader read the manuscript and the authors express their appreciation for their helpful comments.

Institute for Policy Analysis
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December, 1977

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TABLE OF CONTENTS


		Page
1.	Trends and Policies	1
2.	The National Economy by J.A. Sawyer	15
3.	Industrial Output and Employment by D.P. Dungan	57
	Appendix 3.1 Method of Projecting Real Provincial Product and Employment by Industry	103
4.	Ontario Government Revenue and Expenditure by J.W.L. Winder	121
	Appendix 4.1 Methodology of Projecting Ontario Government Revenue and Expenditure	141
	Appendix 4.2 Some Notes on the 1976-77 Fiscal Year	145
	Bibliography	148

DETAILED TABLE OF CONTENTS

	Page
1. TRENDS AND POLICIES	1
1.1 Introduction	1
1.2 Economic Trends	3
1.3 Capital Markets and Government Budgets	7
1.4 Policies	10
 2. THE NATIONAL ECONOMY	 15
2.1 Introduction	15
2.2 The Assumptions for the Reference Solution	17
2.2.1 Government Fiscal and Monetary Policy	17
2.2.2 The External Environment	17
2.2.3 Population and Immigration	18
2.2.4 Energy	18
2.2.5 Unemployment and the Structure of Labour Markets	19
2.2.6 Agriculture	21
2.2.7 The Political Environment	21
2.3 The Short-Run Outlook	23
2.4 The Outlook for the 1980s from the Reference Solution	31
2.5 Some Additional Solutions	40
2.5.1 Devaluation of the Canadian Dollar	41
2.5.2 Increased Exports	42
2.5.3 Increased Capital Inflow	43
2.5.4 Improved Labour Market Structure	44
2.5.5 Increased Investment	45
2.5.6 Personal Income Tax Reduction	45
2.5.7 Sales Tax Reduction	46
2.5.8 Government Expenditure Increase	46
2.5.9 Increased Money Supply	47
 3. INDUSTRIAL OUTPUT AND EMPLOYMENT	 57
3.1 The Industry-Ontario Model; A Brief Description	57
3.2 Sources of Growth	59
3.3 Growth of Ontario Real Product and Employment: The Reference Solution	63
3.3.1 Pattern of Final Expenditure: National Industrial Projections	63
3.3.2 Ontario Real Product and Employment	70
3.3.3 Ontario Labour Force and Unemployment Rate	85
3.4 The Additional Solutions	87
3.4.1 Devaluation of the Canadian Dollar	88
3.4.2 Increased Exports	88
3.4.3 Increased Capital Inflows	89
3.4.4 Improved Labour Market Structure	95

DETAILED TABLE OF CONTENTS

	Page
3.4.5 Increased Investment	95
3.4.6 Personal Income Tax Reduction	100
3.4.7 Sales Tax Reduction	101
3.4.8 Government Expenditure Increase	101
3.4.9 Increased Money Supply	101
Appendix	
3.1 Method of Projecting Real Provincial Product and Employment by Industry	103
A3.1 Introduction	103
A3.2 Procedure	103
A3.2.1 Obtaining National Real Domestic Product by Industry	104
A3.2.2 National Employment by Industry	109
A3.2.3 Ontario Product and Employment Projections	110
A3.3 An Ontario Impact Table	111
A3.4 Strengths and Limitations	116
A3.5 Goodness of Fit	118
 4. ONTARIO GOVERNMENT REVENUE AND EXPENDITURE	 121
4.1 Introduction	121
4.2 Economic Background for the Projections	123
4.3 The Revenue Projections	123
4.4 The Expenditure Projections	131
4.5 Implications for Net Cash Requirements	133
4.6 Additional Solutions	135
4.6.1 Effect on Total Ontario Government Revenue	135
4.6.2 Effect on Total Ontario Government Expenditure	135
4.6.3 Effect on Ontario Government Net Cash Requirements	135
4.6.4 Effect on Ontario EPF Payments from the Federal Government	136
Appendices	
4.1 Methodology of Projecting Ontario Government Revenue and Expenditure	141
4.2 Some Notes on the 1976-77 Fiscal Year	145



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Chapter One

TRENDS AND POLICIES

1.1 INTRODUCTION

The objective of the earlier study by Foot, Pesando, Sawyer, and Winder (1977) was to draw attention to some problems which may confront the Ontario economy over the decade 1977-87 if certain economic trends continue. In the year since that study was done there have been changes in the economic climate -- energy investments, inflation and unemployment rates, foreign exchange rates, for example -- so that an update of the earlier study seemed advisable. There are, however, no major changes affecting the earlier study of population and labour force and capital markets. The reader is referred to Chapters 3 and 4 of the earlier study for a discussion of these topics.

The present study updates the projections for the national economy and the projections of Ontario output and employment and Ontario Government revenue and expenditure. The methodology is similar to that of the previous study and the reader is referred to that volume for a discussion of the methodology.

It must be emphasized that the projections in the study are *conditional projections*, not forecasts. An improved version of the TRACE model (Mark IV E)¹ was used to translate a set of assumptions concerning the economic environment and economic policy into a projection of the national economy to 1987. Updated (1971) input-output matrices and productivity projections were then used to translate the aggregate demand projections into industrial distributions of output and

1 This version of the model is described in Institute for Policy Analysis (1977).

Table 1.1

REFERENCE PROJECTIONS: THE NATIONAL ECONOMY^a

	Annual Average Growth Rate (per cent)			
	From 1967 to 1972	From 1972 to 1977	From 1977 to 1982	From 1982 to 1987
			This Study	Economic Council of Canada ^b
Real ^c gross national product	5.3	3.9	5.2	4.6
Real personal consumption	5.5	5.3	5.4	3.9
Real government expenditure on goods and services	5.0	3.1	3.9	4.6
Real business gross fixed capital formation	4.6	4.5	6.3	5.2
Real exports	8.4	3.1	5.0	5.5
Real imports	7.8	6.5	5.5	4.6
Implicit price index of GNP	4.1	10.4	6.3	6.6
Implicit price index of personal expenditure	3.6	8.6	5.9	6.6
Real personal disposable income per person	4.3	4.5	3.3	3.1
Population	1.4	1.4	1.3	1.2
Labour force	2.9	3.3	2.1	2.1
Employment	2.3	2.9	2.4	2.1
Annual Average				
	1968-72	1973-77	1978-82	1983-87
Unemployment rate (per cent)	5.4	6.6	7.5	6.1
Government (all levels) surplus or deficit ^d (\$ billion)	0.69	-1.92	-3.12	-0.47
Current account of balance of payments (\$ billion)	0.13	-2.98	-5.99	-12.42
Foreign exchange rate (C\$ per U.S.\$)	0.96	0.99	0.93	0.93

a The data for 1967-77 are historical; for 1978-87 they are model projections.

b Economic Council of Canada (1977a, 1977b).

c "Real" means in constant dollars.

d National accounts basis.

employment. Ontario share coefficients were then applied to derive Ontario industrial distributions. A model of Ontario government revenues and expenditures originally developed by David Foot (1977) uses projections of national variables from the TRACE model to project Ontario government revenues and expenditures. To emphasize the conditional nature of the projections and the sensitivity of the reference (or basic) solution of the model to alternative assumptions, nine additional solutions of the models were done and the results of these sensitivity experiments are reported at the end of each chapter.

1.2 ECONOMIC TRENDS

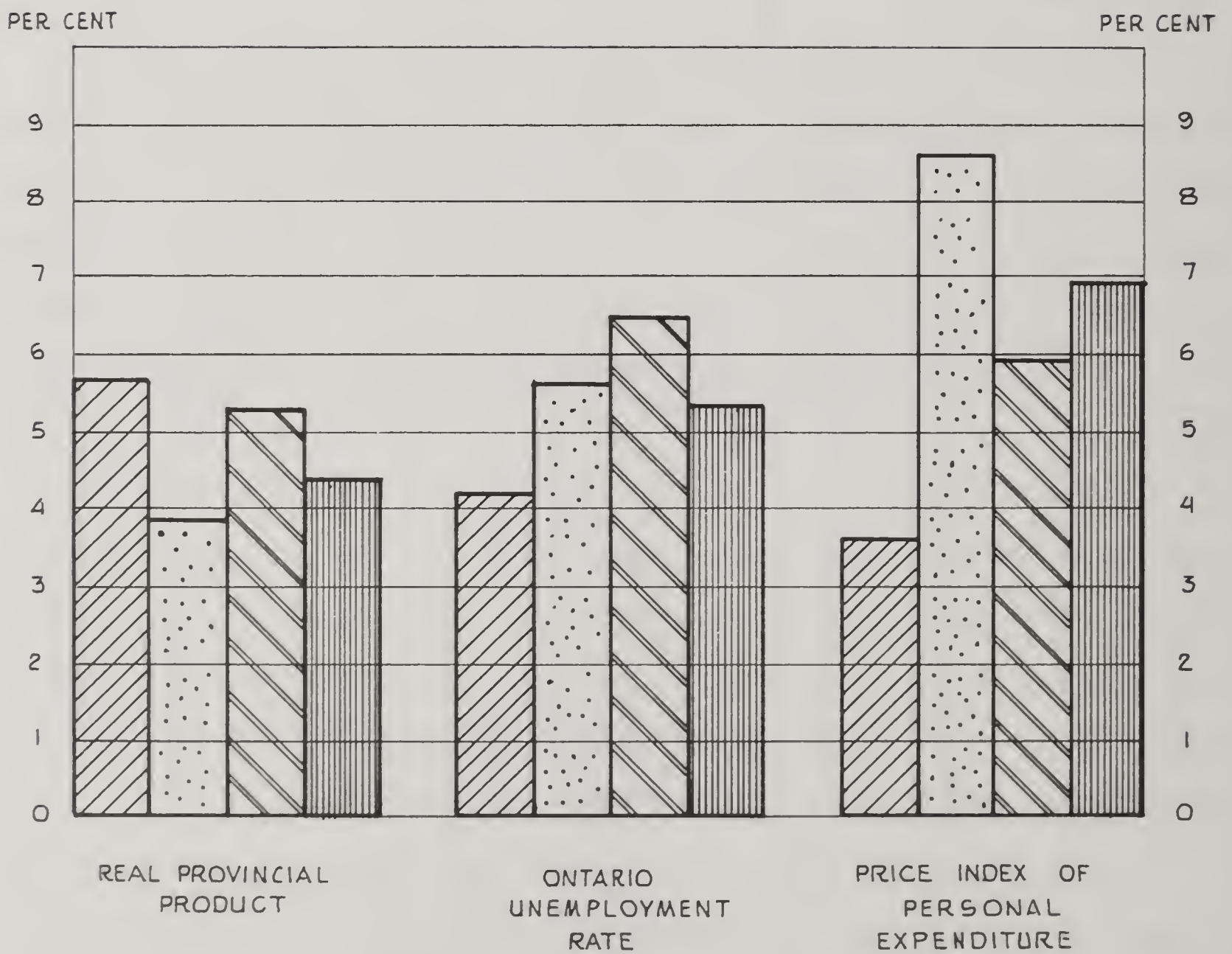
The reference solution for the national economy is one that assumes no change in government monetary and fiscal policy. A specific set of assumptions concerning the world economic environment is incorporated into it. (These assumptions are spelled out in more detail in Chapter Two). The energy investment assumptions are a blend of the "high-price" and "low-price" scenarios described in the earlier study which were based on projections of the Canada Department of Energy, Mines, and Resources (1976). The early years of the projection resemble the high-price scenario while the later years resemble the low-price scenario. That is, in the later years, there is more reliance on electric power and imported petroleum than in the original high-price energy projection. The current reference solution also has a lower foreign exchange rate than in the earlier study. Other significant differences in the assumptions are a higher rate of growth in world trade and more restraint in government expenditures.

The scenario that results from the reference solution (see Table 1.1 and Chapter Two) is one in which unemployment is slow to fall to the six per cent level. As is explained more fully in Chapter Two, at the present time any reduction below that level can probably only be achieved by policies which improve the operation of labour markets -- that is, by policies to improve the flow of information or by policies to improve the job skills of those seeking work or to increase their geographical mobility.

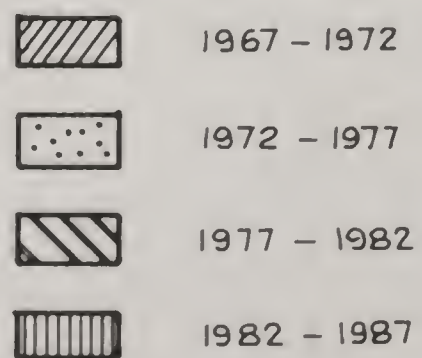
Inflation rates tend to remain near current levels in the reference solu-

CHART 1.1

ONTARIO UNEMPLOYMENT RATE AND ANNUAL AVERAGE
GROWTH RATE OF REAL PROVINCIAL PRODUCT
AND PRICE INDEX OF PERSONAL EXPENDITURE.



SOURCE: TABLES 1.1 AND 1.2



tion. This reflects partly the assumption that inflation rates in the rest of the world will not fall markedly and partly the result that as the Canadian economy moves (in the solution) to higher utilization rates in the 1980s there is increased pressure on wages and prices in labour and product markets. Further monetary restraint could reduce this inflationary pressure, but possibly at the cost of reducing investment and preventing the unemployment rate from falling.

Personal disposable income per person continues to rise throughout the projection period (although at a slightly lower rate) so that the material standard of living continues to increase. It should be kept in mind that the slowdown in the rate of growth of real GNP and consumption in the 1980s is attributable mainly to the slowdown in the rate of growth of the population and labour force (see Chapter Three of the earlier study).

Similar projections, although with somewhat different results, have been made by the Economic Council of Canada (1977a) for the period 1978-82. For comparative purposes, the average rates of growth for this period are also shown in Table 1.1. Although there are compositional differences, the general trend is the same in the two studies.

The extent that the total output and employment projections for Ontario (see Chart 1.1) behave differently from those for the national economy reflects differences in the proportions in which industries are represented in the national economy and in Ontario. For example, petroleum and gas wells are virtually nonexistent in Ontario while they are large, relative to the size of other industry, in Alberta. On the other hand, manufacturing is a much larger proportion of the total in Ontario than in the rest of the economy.

A general feature of the industrial projections is an increasing proportion of employment in the service sector of the economy. This reflects the facts that demand for the products of this sector is increasing and technological change and improving productivity tend to occur more widely in goods-producing industries. (Increasingly, however, technology is becoming more important in the communications, finance, and other service industries). The implication is that increasingly the economy must look to the service industries to absorb the growing labour force.

Table 1.2

REFERENCE PROJECTIONS: THE ONTARIO ECONOMY ^a

	Annual Average Growth Rate (per cent)			
	From 1967 to 1972	From 1972 to 1977	From 1977 to 1982	From 1982 to 1987
Real provincial product ^b				
Population	5.7	3.8	5.3	4.4
Labour force	1.8	1.6	1.4	1.4
Employment	3.6	3.5	2.2	2.0
Government revenue	3.2	3.1	2.4	2.1
Government expenditure	16.0	14.1	11.1	10.6
	15.9	14.1	12.8	13.3
Annual Average				
	1968-72	1973-77	1978-82	1983-87
Unemployment rate (per cent)	4.2	5.6	6.5	5.3
Government net cash requirements (\$ billion)	0.2	1.26	2.94	8.35

a The data for 1967-77 are historical; for 1978-87 they are model projections.

b This series has been calculated at factor cost in 1971 dollars at the Institute for Policy Analysis.

This does not mean that Canada will not have a strong manufacturing sector. It simply means that, given productivity trends, this sector will not absorb much of the future growth of the labour force.

1.3 CAPITAL MARKETS AND GOVERNMENT BUDGETS

Two aspects of financial flows deserve particular comment in the current study: (1) the problem of financing business capital formation, and (2) net cash requirements of the Government of Ontario.

Table 1.3 summarizes business and government fixed capital formation over the past and future decade. (More details on the projections can be found in Tables 2.2 and 2.3). It is a national income accounting truism that in any period of time total saving from all sources (including capital consumption allowances) will equal the amount of domestic gross capital formation. This statistical relation obscures, however, the problem of channelling the funds available from saving into the hands of those making the capital expenditures. The role of financial intermediaries is crucial and smooth functioning capital markets are essential. The projections indicate no major shifts in sources of funds or in investment patterns. There may be, however, more reliance on foreign financing if the energy investment scenario unfolds as envisaged in the reference solution.¹ A tendency towards higher petroleum imports in the later years of the projection would require either larger capital inflows (as shown in the reference solution) or a significantly lower foreign exchange rate than the one in the reference solution.

With respect to Government of Ontario revenues and expenditures, it should be emphasized that the projections indicate what revenues and expenditures would be if past relationships between variables continue to hold and if the national economy reference solution is realized, assuming no changes in tax rates. Apart from changes in tax rates, revenues are determined by incomes, sales, and other economic variables.

¹ Another study of this problem is contained in Peters (1977).

Table 1.3

CAPITAL FORMATION AND ITS FINANCING AS A PERCENTAGE OF GROSS NATIONAL PRODUCT: CANADA^a
(per cent)

	<u>1968-72</u>	<u>1973-77</u>	<u>1978-82</u>	<u>1983-87</u>
Industrial capital	12.6	13.9	14.1	14.8
Residential construction	4.8	5.3	4.8	4.9
Social capital ^b	4.4	3.6	3.5	3.6
Total gross fixed capital formation	21.8	22.8	22.4	23.3
Financing ^c :				
Personal saving	4.3	5.7	4.1	2.9
Government saving ^d	4.6	2.5	2.3	3.2
Capital inflow from abroad ^e	-0.2	1.8	2.0	2.4
Corporate retained earnings and business capital consumption allowances	12.9	12.8	13.5	13.6

a The data for 1967-77 are historical; for 1978-87 they are TRACE model projections.

b Government fixed capital formation plus the investment of private non-commercial institutions.

c May not add to total capital formation because of omission of inventory change and residual error of estimate.

d Including government capital consumption allowances.

e Including change in official international reserves.

Expenditures, on the other hand, are to a large extent directly determined by the Government although in the short run it may be difficult to make large decreases without severely disrupting established government programs. The projections of government expenditure indicate what these expenditures would be if existing programs continue to be related to growing community incomes and other variables. The equations do not, therefore, capture the current restraint on government expenditure.

A basic question raised by the projections is: can the dramatic slowdown in the rate of government expenditure be sustained so that the budget could be balanced in fiscal year 1981? The projections indicate that this would require a substantial departure from historically evolving trends. Can restraint be maintained or will the pressures for expenditure burst the recently imposed bonds? It might be pointed out in this context that the indexation of the personal income tax schedule has been an important and useful device for restraining government expenditure since it restricted the tendency for revenues, and hence expenditure, to grow as a result of inflation.

A second question relating to the government budget is whether the budget should be balanced. The desirability of restraint in government expenditure should not be confused with this second question. Insofar as the economy is operating below potential, stimulation is required.¹ The Economic Council of Canada (1977a) has argued that tax cuts are a desirable way to achieve this stimulus and to move the economy towards full employment. Although it is our view that more emphasis should be placed on business investment, the general view that in an economy that is below potential government deficits are desirable merits support. The goal of a balanced budget should be coupled with a plan to achieve full employment.

The previous study (Foot, *et al.*, 1977, Chapter Four) drew attention to what may be the most significant development in capital markets which will affect the Government of Ontario -- the marked reduction in the flow of funds available

¹ This point is recognized by the Government of Ontario. See *Ontario Budget 1977*, Budget Paper C, p. 10.

from the Canada Pension Plan and other superannuation funds. For the past ten years, Ontario has relied almost exclusively on borrowing from these non-public sources to meet its cash requirements. In view of the apparent importance to the Province of maintaining its high credit rating, and thus ensuring its access to the United States capital market, the input of financing considerations into taxation and/or expenditure decisions will undoubtedly assume greater importance in the years ahead. Because of the interdependence of the borrowing requirements of the Province and Ontario Hydro, planned capital expenditures of Ontario Hydro may also be adjusted in response to the tightening financing constraints. If contribution rates to the Canada Pension Plan were to be increased, some of the pressure emanating from the reduced flow of non-public funds would be postponed, but not eliminated. The likelihood that the contribution rates to the Canada Pension Plan will be increased in the near future has been reduced in light of the recent recommendation of its Advisory Committee that the Plan be funded on a "pay-as-you-go" basis. Consequently there is likely to be continued pressure on provincial taxation and/or expenditure decisions over the next decade resulting from the reduced flow of non-public funds from the capital markets.

1.4 POLICIES

The broad picture which emerges from this study is one in which both unemployment and inflation may continue at what are considered high rates by historical standards. The high unemployment rate may, however, be deceptive in that the major cause of unemployment may be structural problems in labour markets, not a gross insufficiency of aggregate demand. It is important to recognize that although approximately eight per cent of the Canadian labour force is unemployed at the present time, three quarters of this unemployment may be due to structural problems¹ such as (1) inadequate flows of information between potential employers and job seekers concerning the type and location of job vacancies, (2) the mismatching of the training of job seekers with the skills required for the vacant

¹ See the references on page 20 and *Ontario Budget 1977*, Budget Paper A which estimates the "full employment norm" for Ontario in 1977 to be 5.3 per cent.

jobs, (3) the mismatching of the location of job seekers and the location of job vacancies, and (4) the incentive system to obtain jobs and remain employed, given the Unemployment Insurance Act. Hence, labour markets are currently much tighter than the eight per cent unemployment rates indicates.

A two-fold attack on the economic problems of unemployment and inflation would be to improve the functioning of labour markets¹ and to maintain fiscal restraint and a moderate rate of growth in the money supply. Policies which reduce business uncertainties and are conducive to an expansion of business capital expenditures (including energy investments) are, in the long run, likely to be most effective in increasing aggregate demand while at the same time also increasing potential output and reducing price pressures in product markets. Improvements in the structure of labour markets will also increase potential output and reduce wage pressures in labour markets. If these policies are not sufficient to bring about full employment, then reductions in sales or income taxes should be considered. It is hoped that the series of model solutions and their results presented at the end of each chapter will be of use in helping policy makers arrive at a suitable set of policies for both the Canadian and Ontario economies.

A critical factor in determining the future course of both economies is the supply of energy. Movement of domestic energy prices towards world prices will stimulate domestic supplies, encourage conservation and the development of new technologies.² If these are not forthcoming, as the model solutions indicate, an increased reliance on imported energy will likely lead to a further depreciation of the Canadian dollar and even higher general price levels in Canada.³ Policies designed to prevent adjustments to the higher price of energy, like most interferences with market mechanisms, only create distortions elsewhere in the economic system.

1 See Palmer (1977) for a discussion of recommended policies in the United States in this area and see Dodge (1977) for a discussion of Canadian skilled labour supply imbalances.

2 The reader may be interested in studies done at the Institute for Policy Analysis by M.K. Berkowitz (1977) and D.N. Dewees (1977a and 1977b).

3 Recent discoveries of oil and gas in Alberta may, however, transform the long-term gas supply situation. See *The Financial Post*, Toronto, December 31, 1977 pp. 1-2.

A warning must also be made concerning a possible over-reliance on foreign capital for financing domestic capital formation. As the model solutions indicate (see Chapter Two), such inflows have significant upward effects on the foreign exchange rate and may prevent or delay required adjustments of the exchange rate to maintain purchasing power parity (as happened in the mid-1970s). Moreover, such borrowing creates a future outward flow of interest and dividends which adds to the current account deficit. Government surpluses (although creating somewhat of a "fiscal drag" on the economy) may be more appropriate as a method of financing domestic capital formation. The "fiscal drag" can be offset by a monetary policy which lowers real interest rates and stimulates business investment. To quote Harry Johnson (1962, p. 49)

There is, ... a *prima facie* case, on strictly economic grounds, for the government to stimulate economic growth by increasing the rate of saving in the economy by budgeting for a surplus, and ensuring that the saving is translated into investment by pursuing an appropriate easy monetary policy.

In assessing the ease of monetary policy, it is, of course important to distinguish between real and nominal interest rates. In the current economic situation, a reduced rate of growth of the money supply is necessary to lower the rate of inflation. Too restrictive a monetary policy can, however, increase real interest rates and have an adverse effect on investment.

With respect to the industrial structure of the economy the conclusions of the earlier study merit repetition.¹

- (i) The changing structure of industry reflects to a large extent changing consumer demands and should be adapted to, not resisted.
- (ii) Growth in the average productivity of labour should result from technical change and increased investments. This will occur if businesses anticipate that such actions will be profitable. Hence, uncertainty about taxation and regulation should be reduced as much as possible.

¹ See Foot *et al.* (1977), pp. 289-90.

- (iii) Increased investments may achieve economies of scale where the size of the market can be expanded. This suggests that barriers to trade, both interprovincial and international, should be reduced. Insofar as economies of scale lead to concentration within industries, international competition, in the absence of trade barriers, should protect the consumer from the exertion of market power by firms within such industries. Competition policy is, however, important in protecting the consumer in purely domestic industries.
- (iv) Increasingly, new job opportunities will exist in the service industries.

Chapter Two

THE NATIONAL ECONOMY

by

John A. Sawyer

2.1 INTRODUCTION

This chapter presents details on the macroeconomic projections for the national economy which were highlighted in Chapter One. The projections are *conditional* projections, *not* forecasts. In each case, a specific set of assumptions is articulated quantitatively and fed into the TRACE econometric model of the Canadian economy.¹ The solution of the TRACE model then provides a quantitative projection of the Canadian economy over the next decade which is both internally consistent and consistent with the assumptions.

The "reference solution"² is one that assumes no change in government fiscal or monetary policy as currently perceived. This solution is obviously not a forecast since government policy will undoubtedly change if the path followed by the economy is not considered a desirable one. Some additional solutions are therefore presented in which the effects of changes in policy, such as tax changes, are simulated using the model. These model solutions are then compared with the reference solution in order to assess the effect of the policy change. Some additional solutions are also presented in which the assumptions about the economic environment, such as the growth in world trade or the factors explaining business investment, are varied and these solutions are also compared with the reference solution.

1 See Institute for Policy Analysis (1977) for a complete description of the version of the TRACE model, Mark IV E, used for this study.

2 The term "control solution" is sometimes also used.

Table 2.1

ASSUMPTIONS UNDERLYING THE REFERENCE SOLUTION^a

	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
	percentage annual rate of growth									
External Environment										
U.S. real gross national product	4.3	3.9	3.4	3.6	4.1	3.6	3.1	2.5	2.7	2.7
U.S. GNP deflator	6.2	6.1	6.6	6.2	5.9	5.7	5.3	5.0	5.0	5.0
U.S. real merchandise imports	6.8	4.4	6.8	8.9	8.5	7.5	6.9	5.5	6.1	6.1
U.S. wholesale price index	6.3	6.3	5.7	5.3	5.1	5.0	4.9	4.9	4.8	4.8
Rest-of-world real merchandise imports	5.8	4.9	7.2	6.8	6.9	7.0	7.1	7.3	7.2	7.2
Domestic Environment										
Money supply (M2)	13.5	12.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5
Government real expenditure on goods and services	3.6	3.3	3.3	4.3	4.2	4.3	4.3	4.3	4.3	4.3
Energy ^b	billions of constant (1971) dollars									
Exports of fuels	1.06	0.99	1.00	1.00	1.00	1.03	1.07	1.11	1.14	1.16
Imports of fuels	0.89	0.90	0.91	0.92	0.96	1.15	1.37	1.53	1.76	1.92
	1971 = 1.0									
Price index of exports of fuels	4.93	5.24	5.58	5.93	6.27	6.63	6.99	7.33	7.70	8.09
Price index of imports of fuels	5.40	5.73	6.11	6.48	6.86	7.26	7.64	8.02	8.43	8.85

a See the text on page 17 for the assumptions concerning the exchange rate and other variables.

b Export and import figures (and prices) include lubricants (that is, it is Standard International Trade Classification group 3).

2.2 THE ASSUMPTIONS FOR THE REFERENCE SOLUTION

2.2.1 Government Fiscal and Monetary Policy

The current restraint on government expenditures is assumed in the reference solution to continue until more normal growth rates for the economy are established and the rate of inflation is reduced somewhat. Hence (see Table 2.1), real government expenditure on goods and services (in constant dollars) is assumed to increase at no more than 3.6 per cent through 1980. Thereafter, the rate of increase is slightly over 4 per cent, although the growth rate is below that of the economy as a whole until 1985. From 1985 on, real government expenditure is assumed to grow at approximately the same rate as real GNP.

Tax rates are assumed in the reference solution to remain unchanged at current levels. Indexing of personal income taxes and old age pensions is assumed to continue throughout the projection period.

The rate of growth of the money supply (M2) in the reference solution was assumed to be reduced gradually from the 1977 level of about 15.5 per cent to 11.5 per cent in 1980 and then to be held constant at that level.

The foreign exchange rate was assumed, for the reference solution, to be held at a level of \$0.930 U.S. per Canadian dollar throughout the projection period. Long-term capital flows were adjusted in the solution of the model to balance the current account deficit at this exchange rate.

2.2.2 The External Environment

The principal market for Canada's exports is the United States. Hence, the assumptions concerning the U.S. economy are critical to the determination of the volume of Canada's exports by the TRACE model.¹ The rate of growth of real

¹ Since the TRACE model is the Canadian model in Project LINK, an international project to link national econometric models and to forecast world trade, and the U.S. model in Project LINK is the Wharton model, the Wharton long-term projection of October 3, 1977 was used to obtain projections for the U.S. economy to 1986. The most crucial U.S. variables in the TRACE model are the wholesale price index (all commodities) and the level of imports of goods.

GNP in the U.S. is assumed to decline steadily until 1980 when it reaches an annual rate of about 3.5 per cent. An increase in the growth rate to 1982 is assumed, followed by a further decline to a rate near 3 per cent a year.

The rate of inflation, as measured by the GNP deflator, is assumed to rise above 6 per cent a year in 1978 and to remain there until 1981. Thereafter slight decreases in the annual rate are assumed, but the inflation rate in the U.S. is not assumed to fall below 5 per cent before 1987.

Despite the low rate of growth of the U.S. economy as a whole, real merchandise imports into the U.S. (except for 1979 and 1985) are assumed to grow at a rate above 6 per cent a year in all years and Canadian exports share in this growth in the TRACE model solution. Imports (in real terms) of the rest of the world are assumed to grow, after 1979, at a rate close to 7 per cent a year. Implicitly this assumes that the present tendency towards protectionism will disappear and that an expansion of world trade will again occur.

2.2.3 Population and Immigration

Net immigration into Canada is assumed in the reference solution to be at a rate of 90,000 persons a year throughout the projection period. This assumption, together with assumptions concerning fertility and mortality, give rise to an assumed annual rate of growth in the population¹ of about 1.3 per cent a year throughout the projection period.²

2.2.4 Energy

At the present time the most reasonable assumption³ concerning the energy scenario facing the Canadian economy seems to be that the price of energy in Canada will rise to world levels but that the result will be a blend of the

1 Population projections are made using the population model of the Institute for Policy Analysis. See Cohen (1976).

2 For more detail see Foot, *et al.* (1977), pp. 33-38.

3 For some detail underlying the energy assumptions, see Foot *et al.* (1977), pp. 21, 31, 75-82, and 309-315.

high- and low-price energy scenarios described by the Canada Department of Energy, Mines, and Resources in its *Energy Strategy for Canada* (1976). More specifically, it is assumed that in the early years energy investments will follow the high-price scenario (modified by the substitution of the Alaska Highway pipeline for the proposed Mackenzie Valley pipeline), but that in later years the pattern will follow more closely the low-price scenario. That is, it is assumed that in the later years there will be more reliance on electric power and less development of domestic gas and oil. Imports of petroleum therefore begin to rise about 1983 in the projection.

The world price of petroleum is assumed to remain constant in real terms throughout the projection. The nominal dollar prices rise, however, with the rate of inflation of the U.S. dollar and with any depreciation in the external value of the Canadian dollar. This assumption then determines the price of imports and exports of fuels (other than electric power) in the projections.

In order to raise the level of energy investment to the assumed level, some energy investment was added exogenously.¹ Table 2.2 (on page 32) shows the total real investment picture in the reference solution, including the exogenous addition. Associated with this exogenous investment was assumed to be some exogenous inflows of capital from abroad and, with a time lag, an increase in the outflow of interest and dividends. There was also some exogenous additions to imports to allow for a slightly higher than normal import content of non-residential construction related to pipeline and other energy investment.²

2.2.5 Unemployment and the Structure of Labour Markets

In discussions of policy options available to reduce the present high level of unemployment, it is important to try to distinguish the various causes

1 The exogenous investment was excluded from the capital stock of the business nonagricultural sector and therefore did not affect the potential output in that sector.

2 It was assumed that the Alaska Highway pipeline would be of a size of pipe which would allow the use of Canadian manufactured pipe with a small amount of imported materials.

of unemployment and to assess quantitatively how much unemployment is attributable to each cause. Only then can policies be adopted which have a reasonable chance of successfully reducing the unemployment rate. Economists distinguish two basically different types of unemployment: (1) unemployment resulting from an insufficiency of aggregate demand, and (2) unemployment resulting from structural problems in labour markets.

To estimate how much unemployment results from an insufficiency of aggregate demand, and, therefore, how much reduction in the unemployment rate can be achieved by macroeconomic policies, it is important to try to estimate the amount of unemployment due to structural problems in labour markets. Under the heading of structural problems is included problems relating to (1) the flow of information between potential employers and job seekers concerning the location and type of job vacancies, (2) the training of job seekers so they have the skills required for the vacant jobs, (3) the geographical mobility of job seekers so they can locate where there are vacant jobs, (4) the incentive system to obtain jobs and remain employed, given the provisions of the Unemployment Insurance Act. Studies of unemployment by Canadian economists¹ suggest that at the present time close to six per cent of the labour force may be unemployed for reasons that are attributable to structural problems in the labour force.² Thus, given that the present level of unemployment is near eight per cent, policies to increase aggregate demand may be expected to reduce the unemployment rate by no more than two percentage points.³

Thus, in defining potential output for the economy in the reference solution, full employment in a macroeconomic sense was defined as existing when six per cent of the labour force is unemployed. That is, given the present structure of labour markets, when unemployment falls to this level, labour markets are

1 See Green and Cousineau (1976); Grubel, Maki and Sax (1975); Meltz and Reid (1976); and Rea (1977).

2 This compares with approximately 3.5 per cent from 1956 - 1966.

3 Thus, the contribution of insufficient aggregate demand to the current level of unemployment is less than in 1959 and 1961 when half of the 7 per cent unemployment in those years can be attributed to insufficient aggregate demand.

tight and any increase in aggregate demand tends to make wage rates rise rapidly and to increase the rate of inflation. Thus, in the reference solution the rate of inflation begins to increase in the mid-1980s when the unemployment rate falls towards six per cent. If policies can be undertaken to improve the structure of labour markets and to reduce the proportion of the labour force unemployed for structural reasons, the point at which the inflation rate begins to rise can be lowered and the rate of inflation lowered. The reference solution assumes no such improvement in the structure of labour markets.

2.2.6 Agriculture¹

The TRACE model does not project agricultural variables; hence, all values of agricultural variables entering into the model solutions are determined outside the model. The assumptions used for agriculture in the reference solution were not changed or affected by the assumptions made in the various alternative solutions. That is, the same set of values for agricultural variables appear in all solutions. Real output (real domestic product) in agriculture was assumed to grow at an annual rate of 1.5 per cent a year and employment was assumed to remain unchanged at present levels. Investment was assumed to be such that the capital-output ratio in agriculture is rising at an annual rate of 4 per cent throughout the projection period. The value-added index of the price of agricultural products was assumed to rise at a rate of 5 per cent a year.

The assumptions concerning agriculture also affect exports of goods since exports of wheat and wheat flour are determined exogenously. After 1978 these exports, in real terms are assumed to grow at 6 per cent a year. The decline in world wheat prices is presumed to end in 1978 and therefore wheat prices on world markets are assumed to grow at a rate of 4 per cent a year.

2.2.7 The Political Environment

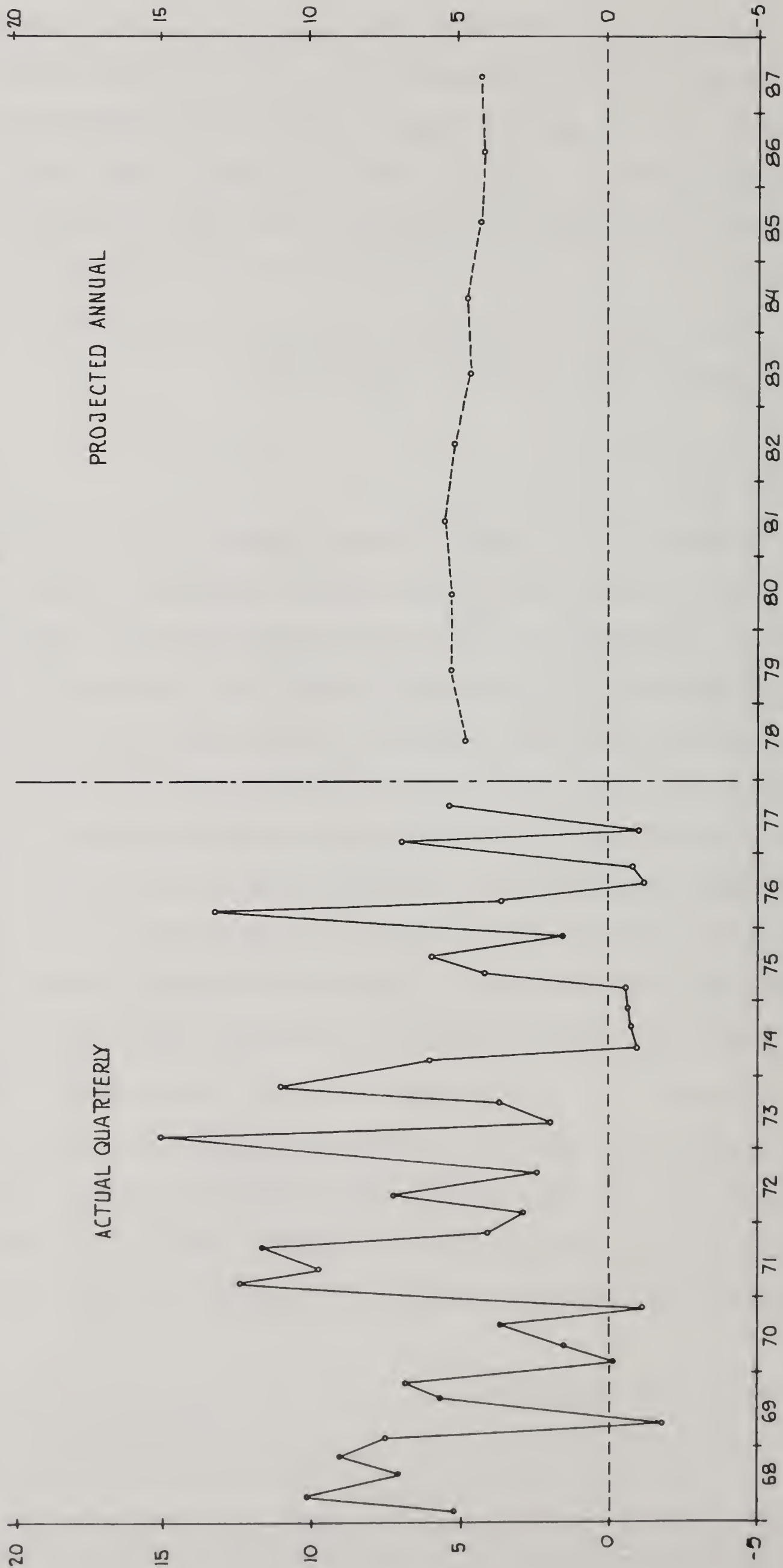
All the model solutions assume that there are no disruptions in interpro-

¹ In the TRACE model agriculture includes fishing, hunting, and trapping.

CHART 2.1

REAL GROSS NATIONAL PRODUCT

(PER CENT CHANGE, SEASONALLY ADJUSTED AT ANNUAL RATES)



vincial trade or in interprovincial financial flows. That is, it is assumed a resolution of the Québec independence question is realized which will not significantly affect the economy and that the "national economy" remains as presently defined.

The solutions also assume that some of the uncertainties inhibiting business investment in Canada will disappear and that from 1979 onward "normal" investment behaviour by the business community will be resumed. The announced removal in 1978 of the wage and profits controls of the current Anti-Inflation Policy should contribute to this restoration of confidence.

2.3 THE SHORT-RUN OUTLOOK

As Chart 2.1 shows, the quarterly path of growth in real gross national product in Canada has been very irregular over the past decade. If a recession is defined as two successive declines in quarterly real GNP, then there were mild recessions in 1974-75 and in 1976. Between these recessions, apart from the first quarter of 1976 when there was a massive inventory accumulation, growth was moderate compared to the higher rates of growth in the period 1971-73.

The 1976 recession appears to be a secondary reaction to the recession of 1974-75, reflecting a general weakening of business confidence - shown by the weakness of business fixed investment and inventory accumulation - as the economy continued to face the following structural problems:¹

- . adjustments to higher energy prices
- . restrictive monetary and fiscal policies
- . the Anti-Inflation Program and uncertainties as to when decontrol would occur
- . political uncertainties in Québec

The recovery in 1977 has been unsteady with only a strong first quarter preventing the 1976 recession from being extended through the first half of 1977.

¹ This analysis is based on T.A. Wilson (1977).

Hence, the viability of the economic recovery has been questioned. The prospects for strong growth in 1978 depend on increases in exports and business capital formation. There are, however, uncertainties concerning both of these.

That the slowdown of fixed capital investment is a world-wide phenomenon was noted by economists attending the Ninth Annual World Meeting of Project LINK¹ in Kyoto, Japan in September, 1977. The economists from 14 industrial countries and 4 international organizations who attended that meeting gave a detailed consideration to the world outlook and issued the following statement:

Since the time of their forecast meeting in March at the United Nations headquarters in New York, LINK economists have found some deterioration in the world outlook, making for somewhat lower expected growth in world production and trade volume. They have marked down their expected growth rate of 13-nation GDP (Australia, Austria, Belgium, Canada, Finland, France, Italy, Japan, Federal Republic of Germany, Netherlands, Sweden, U.K., U.S.A.) for 1977 by approximately $\frac{1}{2}$ percentage point and expect 1978 to be only slightly better for growth than this year. The persistence of under-utilized capacity and high unemployment would continue or worsen under such circumstances. They detect a tendency towards a cyclical slowdown in 1979 unless some positive policies are introduced soon.

The failure of significant recovery in fixed capital investment is a matter of serious concern and countercyclical measures ought to provide for ample stimulus of capital formation. The expected declines in output during 1977 in Sweden and Finland are surprising and disturbing. Good growth in the U.S.A. and projected benefits from the new Japanese stimulus program save this year from being much worse. A positive policy of expansion in the Federal Republic of Germany and also in France and the U.K. would serve to fill significant world needs. It is felt that co-ordinated expansionary policies are entirely feasible at this time. The assembled group would welcome similar measures for expansion in other countries during 1978, including U.S.A., Canada, Netherlands, Belgium, Austria and Australia. Gains to be realized from the application of stimulative policies initiated in 1978 would be widely shared throughout the world economy.

While developing countries, apart from oil exporters, are forecast to realize improvements in their average growth rates during both 1977 and 1978, compared with 1975-76, they will, on average, nevertheless fail to achieve the target growth rate of 6 per cent per annum established for the "second development decade". Should an industrial world growth slowdown occur in 1979, their growth prospects and debt servicing ability would be seriously impaired.

¹ Project LINK is an international research group under the direction of Prof. Lawrence R. Klein which analyzes world trade and the international transmission of economic fluctuations by linking together national econometric models. The TRACE model is the Canadian model in Project LINK.

The participating economists in LINK are all mindful of the potentials and dangers of world inflation but feel justified in concluding that moderate expansionary policies would not, by themselves, re-ignite serious inflationary pressures.

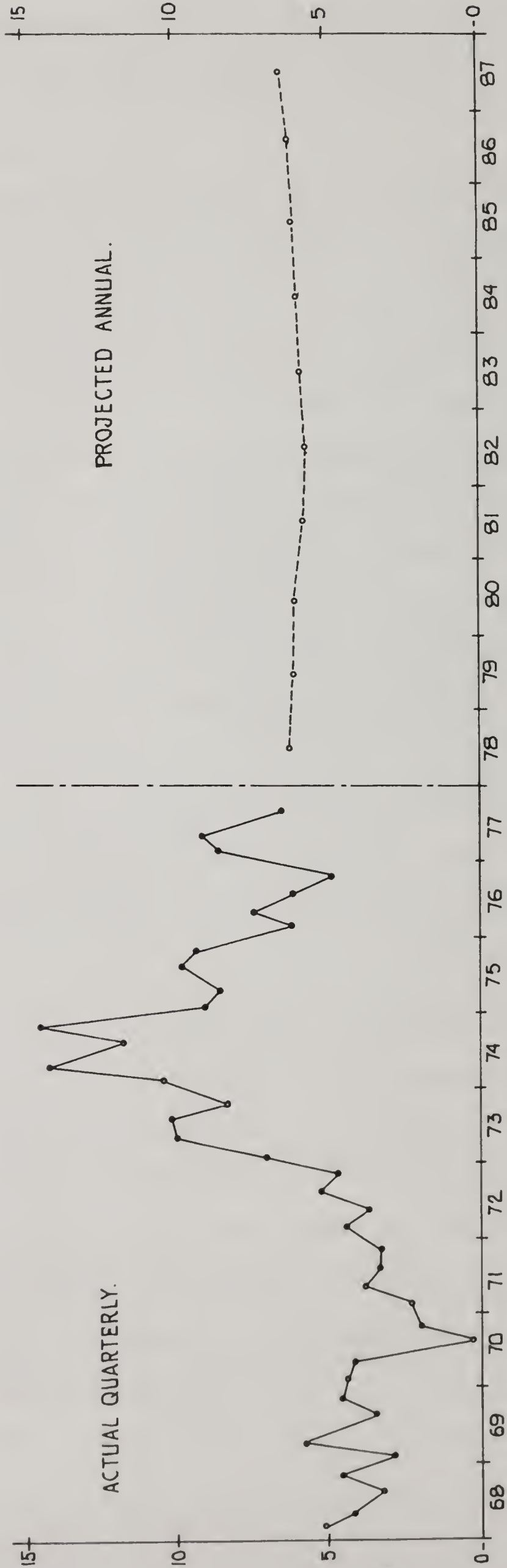
In the Canadian context, further stimulation to business investment may best be achieved through reduction of the uncertainties affecting the assessment of the prospects for favourable returns from investment, rather than through further fiscal stimulation. The fiscal stimulus in the March 1977 budget of the federal government did appear to have altered business perception of the federal fiscal stance favourably. The interim survey of intended business capital expenditures¹ of large firms indicates, however, very little real increase in these expenditures for 1978. Decontrol of profits and dividends was announced in November, 1977 to be effective during 1978. The frequent changes in federal and provincial taxation of natural resource industries create, however, uncertainties about the future profitability of such investment. The tendency of some provinces to nationalize resource industries is a further detriment. If it is recognized that much of the investment in Canadian industry is by multinational companies who make their investment decisions on a world-wide basis, then the importance of establishing in Canada a climate in which the ultimate returns from business investment can be predicted with a higher degree of certainty should be obvious.

In October 1977 some reduction in personal income taxes for lower income groups was announced by the Minister of Finance of the federal government. This should not, however, be interpreted as a general stimulus to the economy since it serves only to offset to some extent the reduction in real wages resulting from the fact that the 6.2 per cent cost-of-living increase in wages allowed in 1977 by the Anti-Inflation Board was less than the realized rate of inflation.

It should be pointed out that, since personal income taxes in Canada are indexed, there is an automatic downward adjustment in taxes each year to allow for the effect of inflation on tax rates. Thus, there is no need in Canada, un-

¹ See *The Globe and Mail*, Toronto, November 17, 1977, p. B1.

CHART 2.2
IMPLICIT PRICE INDEX OF PERSONAL EXPENDITURE.
(PER CENT CHANGE, SEASONALLY ADJUSTED AT ANNUAL RATES)



SOURCE: 1968-77, STATISTICS CANADA; 1978-87, TRACE MODEL PROJECTION.

like the U.S., to cut personal taxes to stimulate the economy in the face of inflation.

The rate of inflation has been another source of concern. As Chart 2.2 shows, the rate of inflation, as measured by the deflator for private consumption expenditures,¹ has decreased markedly from the 1974 peak. Uncertainties concerning the future rate are, however, a large factor contributing towards the unfavourable business climate and the performance of the stock market.

Monetary policy still appears to be trying to "fine tune" the short-run economic path rather than aiming only for longer-term stability. The lags in the effects of a change in monetary policy are such that the economy may have reversed direction before a policy change takes effect. Hence, monetary (or fiscal) policy may be destabilizing if it concentrates unduly on short-run objectives. Chart 2.3 shows the rate of change in the broadly-defined money supply (M2) over the past decade. As can be seen the rapid increases of the early 1970s contributed to the higher rate of inflation in 1974, while the erratic movement thereafter may have contributed somewhat to the alternating periods of contraction and expansion in general business activity.

A result of the rapid inflation of 1974 was a marked deterioration of unit labour costs in Canada relative to the United States.² This was an important factor in the sharp devaluation of the Canadian dollar (see Chart 2.4) which has occurred since the autumn of 1976. The devaluation is having an effect on the rate of inflation in Canada as import prices rise. In the event, however, that this increase in the prices of imported goods can be kept from being compensated for by higher wage rates in Canada, the relative disadvantage Canada is facing in unit labour costs may be reduced by the devaluation. The target range for the rate of growth in the money supply was reduced by one percentage point by the

1 This is the implicit price of personal expenditure on consumer goods and services, a currently weighted price index. A base-period weighted index, such as the Consumer Price Index, is more appropriate for measuring price changes, but, as yet, such an index is not available from the TRACE model.

2 See Organization for Economic Co-operation and Development (1977, p.20).

CHART 2.3

MONEY SUPPLY (M2)
(PER CENT CHANGE)

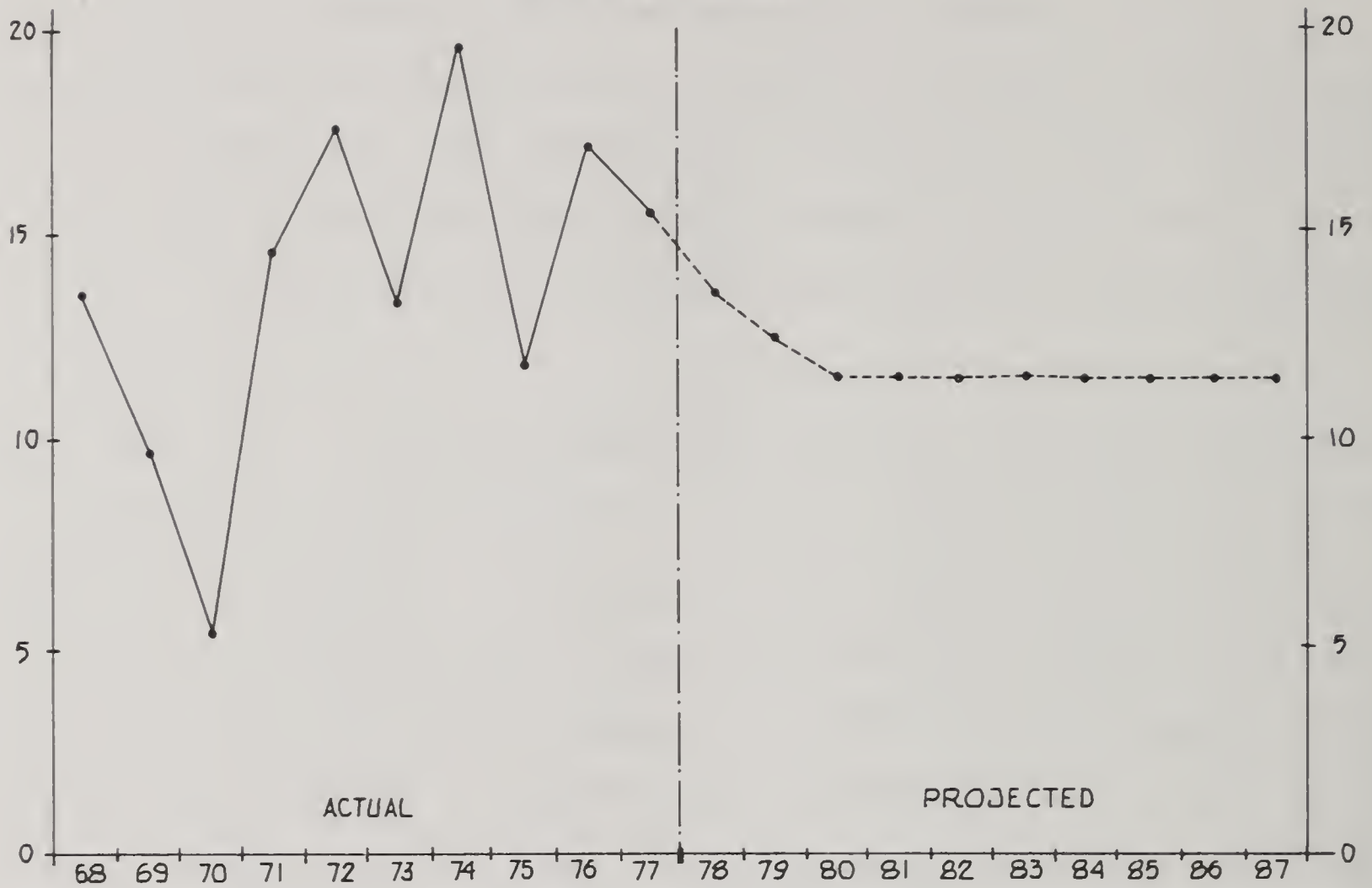
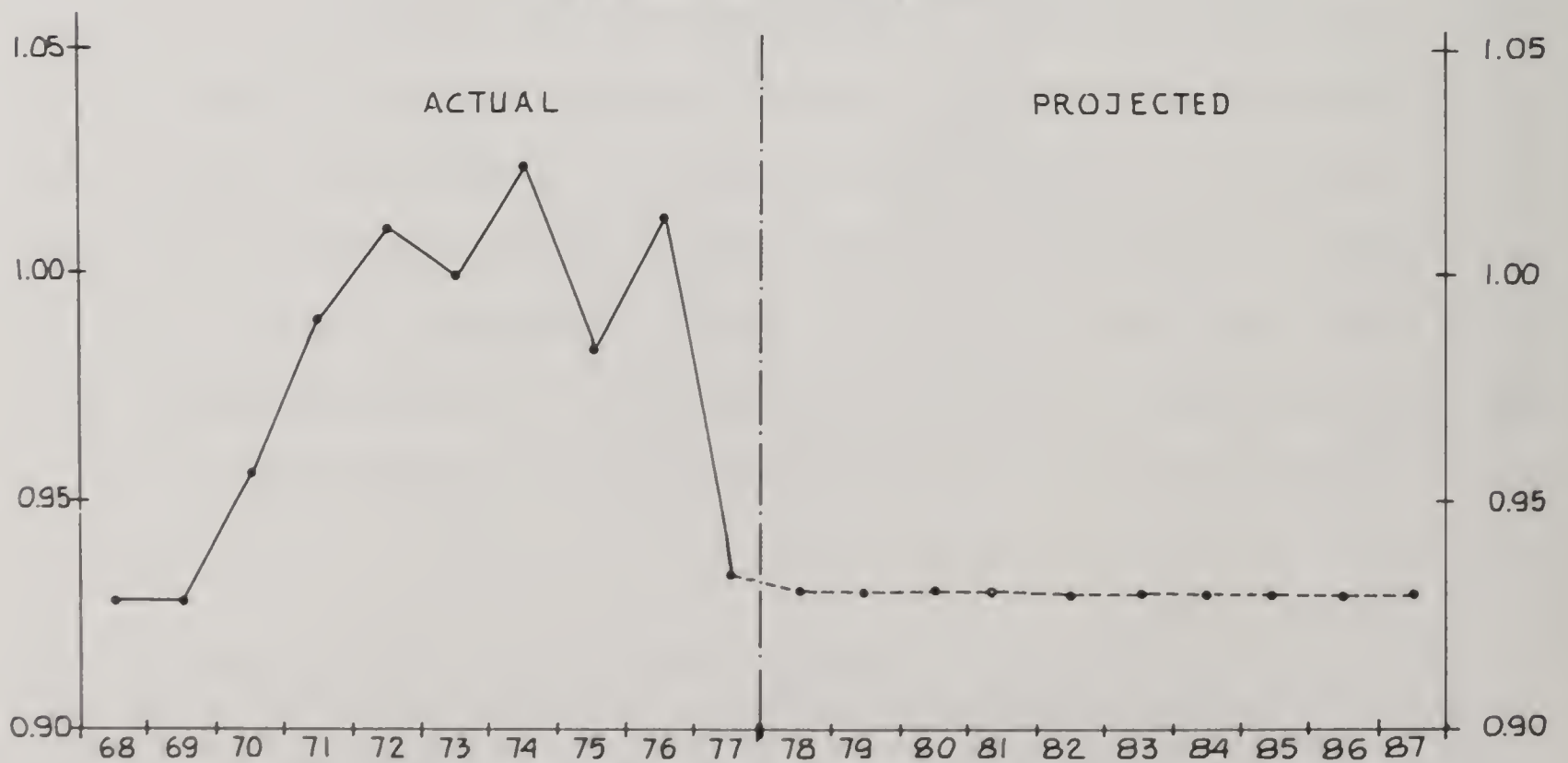


CHART 2.4

FOREIGN EXCHANGE RATE
(U.S. DOLLARS PER CDN. DOLLAR)



SOURCE: 1968-77. BANK OF CANADA; 1978-87 TRACE MODEL ASSUMPTION.

Bank of Canada in October 1977 and this may help reduce the rate of inflation in Canada and restore its competitive position in international trade.

Although the decision has been made to build a pipeline along the Alaskan Highway to carry natural gas from Alaska to the U.S. markets, the specifications of the pipeline have not, as yet, been agreed upon. Depending upon the diameter of the pipe, the major supplier of the pipe may be Canadian or American (or, possibly, Japanese). Thus, the extent to which the construction of the pipeline may give a major stimulus to the Canadian steel industry is still uncertain.

A further uncertainty about the short-term economic outlook arises from the uncertainty as to the foreign exchange rate. The exchange rate between the Canadian and U.S. dollars is frequently well above the rate that would be established by purchasing power parity. The reason is that there is usually an inflow of foreign capital associated with the financing of Canadian capital formation. Variations in the magnitude of this flow can change the foreign exchange rate by several cents, as the 1976 devaluation demonstrated. This capital inflow has, of course, long-term implications for the current account of the balance of payments since it gives rise to a future outflow of interest and dividends. The large-scale capital inflows of the last decade have contributed to a substantial increase in the current account deficit. The imbalance of tourist and travel expenditures has further contributed to the magnitude of the deficit.

Taking all these factors into consideration makes the outlook for 1978 and 1979 very uncertain. If there is a revival of business confidence in 1978, growth of real GNP above 4 per cent in 1978 and above 5 per cent in 1979 may be possible (see Chart 2.1). Little reduction in the rate of inflation may be achieved. It seems unlikely that the rate will fall below six per cent before 1980. The unemployment rate is likely to remain near the present level through 1979 since the growth in the labour force will approximately equal the number of jobs created. (See Chart 2.5.) In short, moderate growth may be achieved if some of the uncertainties concerning the economic environment can be resolved.

CHART 2.5
UNEMPLOYMENT RATE
(PER CENT OF LABOUR FORCE)

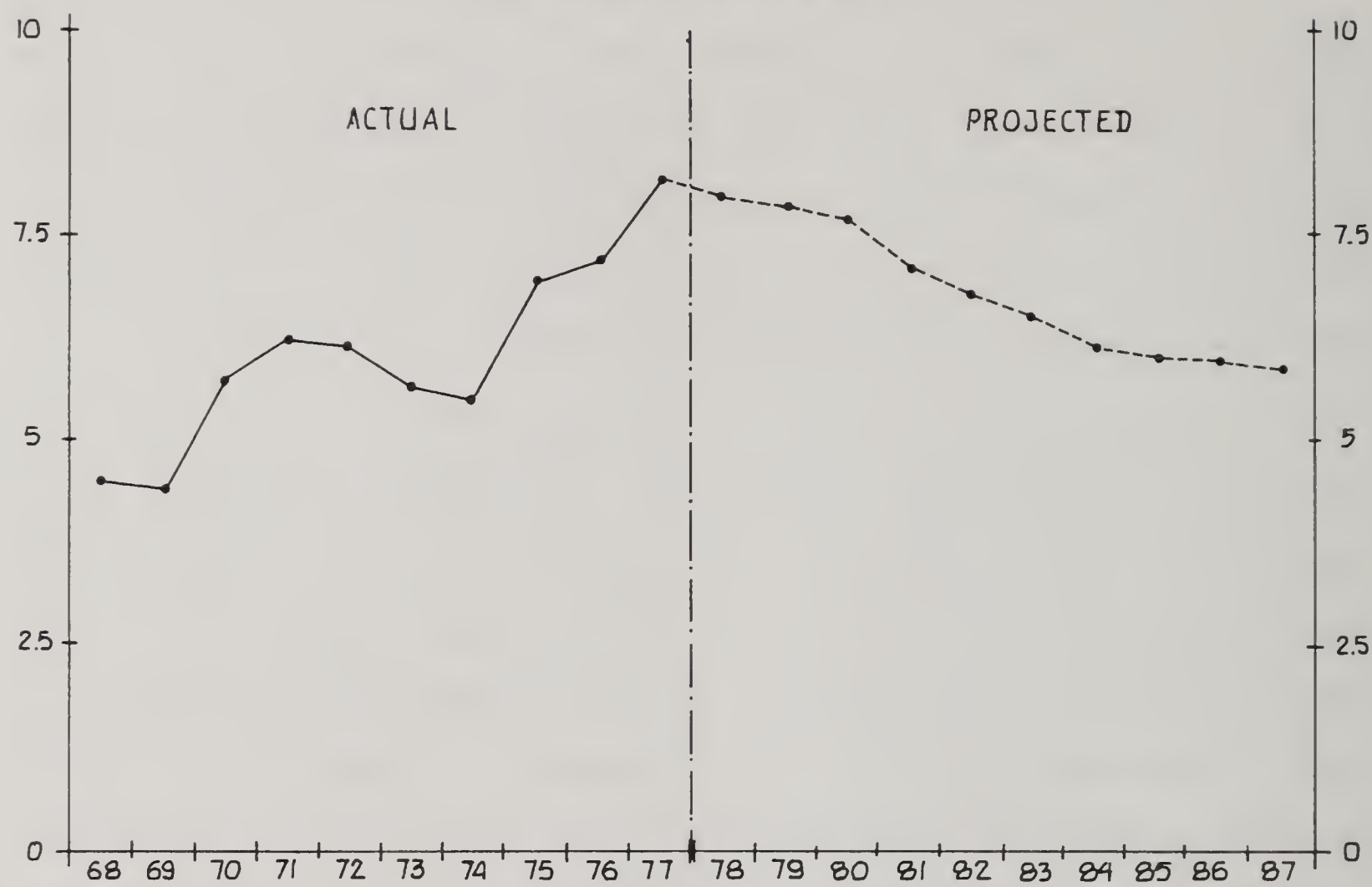
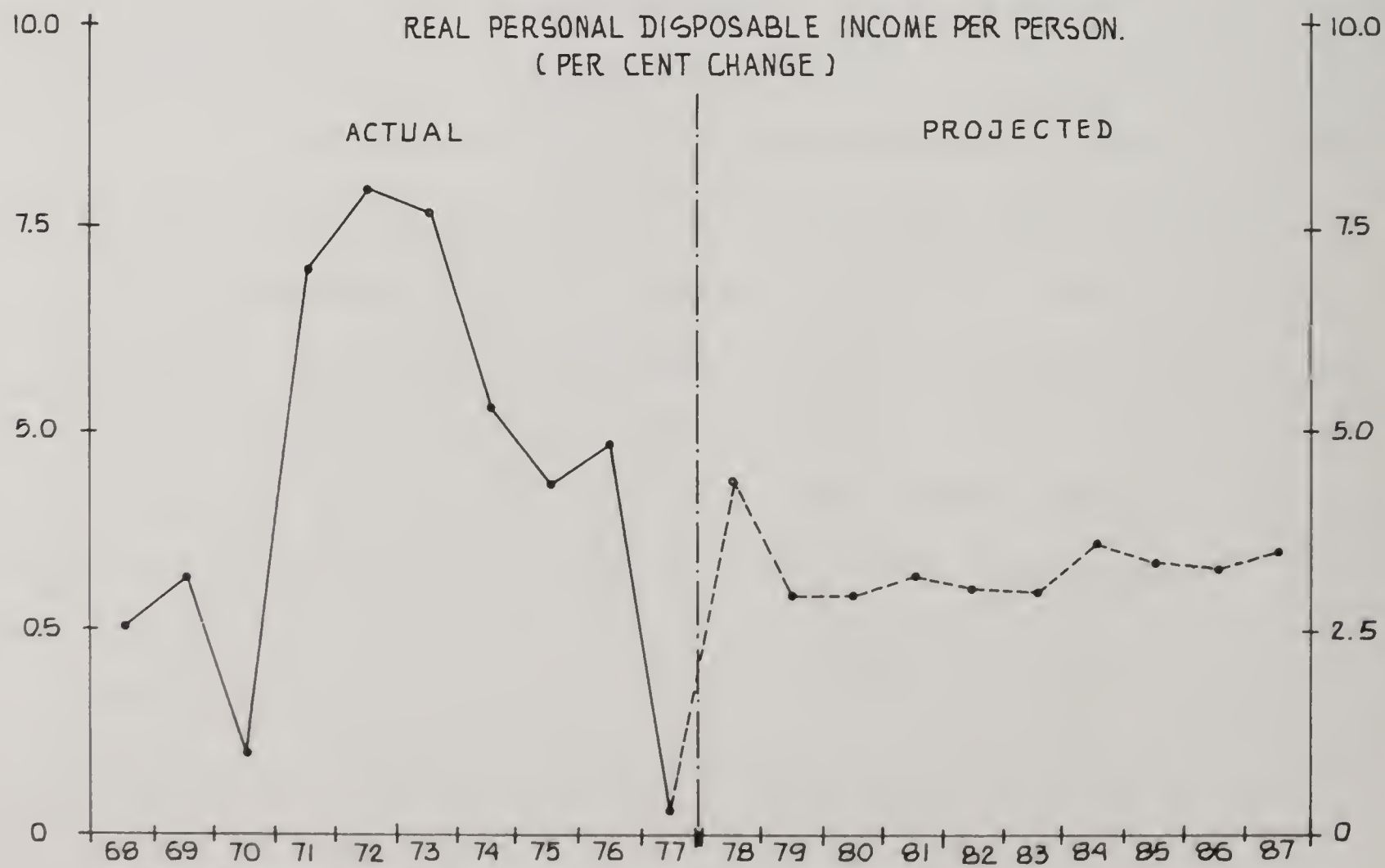


CHART 2.6
REAL PERSONAL DISPOSABLE INCOME PER PERSON.
(PER CENT CHANGE)



SOURCE : 1968-77, STATISTICS CANADA ; 1978-87. TRACE MODEL PROJECTION.

2.4 THE OUTLOOK FOR THE 1980s FROM THE REFERENCE SOLUTION

As was noted above, there is no force tending to emerge in 1978 or 1979 to help the economy recover sharply from the slow growth of the 1974-77 period. As the economy moves into the 1980s, again no such force is appearing in the reference solution. It is anticipated (see Table 2.2) that there will be substantial energy investments, but, in constant dollar terms, these are not proportionately so much above the "normal" levels of energy investment which a growing economy tends to generate that a spending boom will be triggered.¹ If "potential output"² is taken as a measure of "full employment output" in a macroeconomic sense, then, given that the economy fell markedly below potential output from 1974-77, there is insufficient aggregate demand in the reference solution to attain potential (see Chart 2.7). The economy does grow at a rate exceeding the potential output growth rate in the reference solution in every year from 1978 to 1987, but not by enough to close the gap opened in the 1974-1977 period. Hence, the utilization rate (the ratio of actual to potential output) does not rise above 97 per cent by 1987. During the projection period, potential output for the economy as a whole³ grows at a rate of about 4.25 per cent a year from 1979 to 1985 and then the rate declines slightly as a result of the decline in the rate of growth of the labour force.

This is in marked contrast to the recovery from earlier recessions in the post-war period.⁴ But in the earlier cases, there were strong forces exogenous to the Canadian economy tending to make the recovery strong and to make the economy grow at rates markedly above potential. For example, the Korean War in 1950-53, the resource industry boom stimulated by the Report of the Paley Commission

1 The recent discoveries of oil and gas in the West Pembina and Elmworth regions of Alberta may substantially transform the long-term supply situation. Discoveries in the Elmworth region are large enough to throw doubt on the need for building the Dempster spur pipeline to the Mackenzie Delta. *The Financial Post*, Toronto, December 31, 1977.

2 See Foot *et al.* (1977, pp. 39-42) for a more detailed discussion of potential output.

3 As measured by gross domestic product at factor cost in constant dollars.

4 See Murphy and Laurie (1977) for an analysis of Canadian cycles, 1947-76.

Table 2.2

CAPITAL FORMATION

	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
	billions of constant (1971) dollars									
Industrial Capital	16.93	18.35	19.66	21.46	22.97	24.14	25.50	26.39	27.33	28.28
Energy investment	5.42	6.24	6.99	7.87	8.61	9.00	9.52	9.51	9.51	9.49
(Exogenous component)	(0.40)	(0.95)	(1.40)	(1.95)	(2.35)	(2.40)	(2.55)	(2.15)	(1.75)	(1.30)
Other	11.51	12.11	12.67	13.59	14.36	15.14	15.98	16.88	17.82	18.79
Energy investment as a percentage of industrial investment	32.0	34.0	35.6	36.7	37.5	37.3	37.3	36.0	34.8	33.6
Housing and Social Capital	10.49	11.17	11.75	12.37	13.00	13.61	14.38	15.14	15.88	16.72
Residential construction	6.05	6.49	6.83	7.18	7.52	7.84	8.30	8.73	9.13	9.60
Social capital ^a	4.44	4.68	4.92	5.19	5.48	5.77	6.08	6.41	6.75	7.12
Total Gross Fixed Capital Formation	27.42	29.52	31.41	33.83	35.97	37.75	39.88	41.53	43.21	45.00
Capital Formation as a percentage of GNP	21.6	22.1	22.3	22.8	23.1	23.1	23.3	23.3	23.3	23.3

a Government fixed capital formation plus the investment of private non-commercial institutions.

Table 2.3

FINANCING OF CAPITAL FORMATION

	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
	billions of current dollars									
Business capital formation (including residential construction)	45.02	51.61	58.51	66.12	73.90	81.79	91.54	100.21	109.97	120.66
Government capital formation	7.95	8.84	9.82	10.90	12.09	13.46	15.01	16.60	18.42	20.47
Total	52.97	60.45	68.33	77.02	85.99	95.25	106.55	116.81	128.39	141.13

per cent

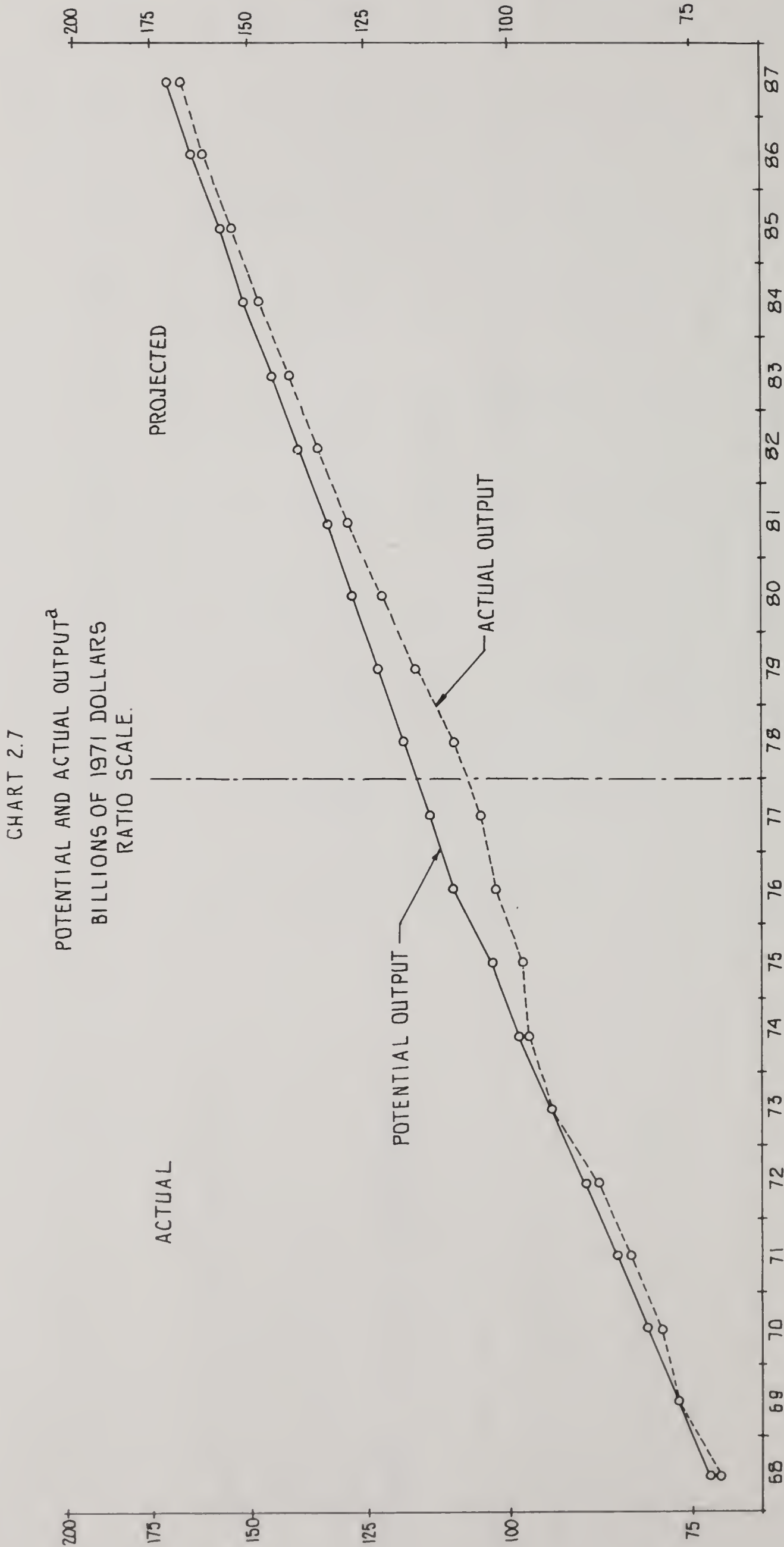
Financing: Percentage financed by^a

Personal saving	23.1	19.5	16.9	16.1	15.1	13.7	13.0	12.5	11.7	11.5
Government gross saving ^b	3.8	6.9	10.4	12.1	13.3	14.4	14.8	14.3	13.7	12.7
Capital inflow from abroad	10.5	11.3	10.7	9.8	9.5	10.0	11.1	11.8	13.0	13.8
Corporate retained earnings and business capital consumption allowance	56.8	57.0	57.6	58.2	58.7	58.9	58.3	58.8	59.1	59.5

a Total does not add to 100.0 because of residual error of estimate and omission of some negligible items.

b Including government capital consumption allowances.

Source: TRACE model projection



a GROSS DOMESTIC PRODUCT AT FACTOR COST.

SOURCE: ACTUAL OUTPUT, 1968-77, STATISTICS CANADA; 1978-87. TRACE MODEL PROJECTION; POTENTIAL OUTPUT, 1968-87, TRACE MODEL CALCULATION.

on Raw Materials in 1955-57, the Vietnam War from 1964-69, and a period of general scarcity of raw materials, 1971-73. Without these exogenous forces, the Canadian economy would not have achieved the recoveries it did. It should, however, be noted that exogenous events are, by their nature, difficult to forecast and for this reason longer-term forecasts frequently miss the mark. The anticipated energy investment expenditures of the 1980s, as stated above, do not generate sufficient aggregate demand to make a comparable recovery. It is this failure to achieve potential output levels that keeps the unemployment rate above the six per cent level through much of the projection period.

The fact that at an overall level there is a rough balance in the accounts for all levels of government (on a National Accounts basis) from 1982 onward despite the fact that there is a tendency for unemployment to be above the six per cent level, suggests that there is some "fiscal drag" on the economy. This conclusion is reached, however, only tentatively. The government balance is determined residually in the model solution and small errors in the large number of revenue and expenditure components could cause substantial errors in the balance. The same caution must also be applied to projections of the unemployment rate since unemployment is the residual obtained by subtracting projected employment from the projected labour force.

It should also be pointed out -- and this may be an argument against undue expansion of the economy -- that since the utilization rate does rise in the latter part of the projection period, the rate of increase in wages and prices rises towards the end of the projection. This tends to increase markedly the size of the current account deficit in the balance of international payments and, if this projection were to be realized, either substantial increases in capital inflows would be required or a further devaluation of the Canadian dollar would occur.

Despite the relatively high unemployment rate, it should be noted that real personal disposable income per person rises steadily throughout the projection period (see Chart 2.5, page 30). Thus, the material standard of living of Canadians is expected to continue to increase, although at a slightly lower rate than in the past decade.

Table 2.4

INSTITUTE FOR POLICY ANALYSIS, UNIVERSITY OF TORONTO
TRACE MODEL REFERENCE SOLUTION DECEMBER, 1977

SUMMARY OF PROJECTION

	1978	1979	1980	1981	1982
PERCENTAGE RATES OF GROWTH					
GNP IN CURRENT DOLLARS	11.9	12.0	12.1	11.8	11.4
GNP IN CONSTANT (1971) DOLLARS	4.7	5.2	5.3	5.5	5.1
IMPLICIT PRICE INDEX OF GNP	6.9	6.4	6.4	6.0	6.0
PERSONAL EXPENDITURE ON CONSUMER GOODS & SERVICES IN CONSTANT DOLLARS	5.9	5.5	5.2	5.2	5.1
IMPLICIT PRICE INDEX OF PERSONAL EXPENDITURE	6.1	6.0	6.0	5.7	5.6
GOVERNMENT EXPENDITURE ON GOODS & SERVICES IN CONSTANT DOLLARS*	3.6	3.3	3.3	4.3	4.2
BUSINESS FIXED CAPITAL FORMATION IN CONSTANT DOLLARS	2.4	8.1	7.2	7.5	6.5
EXPORTS OF GOODS & SERVICES IN CONSTANT DOLLARS	5.1	4.5	5.0	5.4	5.1
IMPORTS OF GOODS & SERVICES IN CONSTANT DOLLARS	5.6	6.2	5.1	5.4	5.5
WAGE RATES IN BUSINESS NON AGRICULTURE	8.1	7.7	8.3	8.7	9.0
NORMAL UNIT LABOUR COSTS IN BUSINESS NON AGRICULTURE	4.6	4.4	4.9	5.2	5.5
CORPORATE PROFITS AFTER TAXES	13.4	18.3	17.5	15.7	15.4
PERSONAL DISPOSABLE INCOME IN CONST. DOLLARS	5.8	4.4	4.4	4.6	4.5
POPULATION	1.3	1.3	1.3	1.4	1.4
REAL PERS. DISPOSABLE INCOME PER PERSON	4.4	3.0	3.0	3.2	3.1

* EXOGENOUS

INSTITUTE FOR POLICY ANALYSIS, UNIVERSITY OF TORONTO
TRACE MODEL REFERENCE SOLUTION DECEMBER, 1977

SUMMARY OF PROJECTION (CONT.)

	1983	1984	1985	1986	1987
PERCENTAGE RATES OF GROWTH					
GNP IN CURRENT DOLLARS	11.3	11.6	11.3	11.4	11.5
GNP IN CONSTANT (1971) DOLLARS	4.6	4.7	4.3	4.2	4.2
IMPLICIT PRICE INDEX OF GNP	6.4	6.6	6.7	6.9	7.0
PERSONAL EXPENDITURE ON CONSUMER GOODS & SERVICES IN CONSTANT DOLLARS	5.0	5.2	5.1	5.0	5.0
IMPLICIT PRICE INDEX OF PERSONAL EXPENDITURE	5.8	5.9	6.0	6.1	6.2
GOVERNMENT EXPENDITURE ON GOODS & SERVICES IN CONSTANT DOLLARS*	4.3	4.3	4.3	4.3	4.3
BUSINESS FIXED CAPITAL FORMATION IN CONSTANT DOLLARS	4.9	5.7	3.9	3.8	3.9
EXPORTS OF GOODS & SERVICES IN CONSTANT DOLLARS	4.8	4.6	4.3	4.2	4.1
IMPORTS OF GOODS & SERVICES IN CONSTANT DOLLARS	5.5	6.2	5.9	6.0	6.0
WAGE RATES IN BUSINESS NON AGRICULTURE	9.6	9.9	10.1	10.4	10.5
NORMAL UNIT LABOUR COSTS IN BUSINESS NON AGRICULTURE	6.0	6.3	6.4	6.6	6.7
CORPORATE PROFITS AFTER TAXES	13.3	12.0	11.3	11.0	11.3
PERSONAL DISPOSABLE INCOME IN CONST. DOLLARS	4.4	5.0	4.8	4.7	4.8
POPULATION	1.3	1.3	1.3	1.3	1.2
REAL PERS. DISPOSABLE INCOME PER PERSON	3.0	3.6	3.4	3.4	3.5

* EXOGENOUS

INSTITUTE FOR POLICY ANALYSIS, UNIVERSITY OF TORONTO
TRACE MODEL REFERENCE SOLUTION DECEMBER, 1977

SUMMARY OF PROJECTION (CONT.)

	1978	1979	1980	1981	1982
PERCENTAGE RATES OF GROWTH					
EMPLOYMENT	2.4	2.3	2.3	2.6	2.6
LABOUR FORCE	2.2	2.2	2.1	2.1	2.1
PER CENT					
UNEMPLOYMENT RATE	7.9	7.8	7.7	7.1	6.7
UTILISATION RATE	93.2	94.1	95.1	96.3	97.1
GOVT. OF CANADA BONDS (10 YEARS&OVER) YIELD	8.7	8.7	8.7	8.7	8.8
REAL RATE ON GOVT. BONDS	2.3	2.5	2.6	2.7	2.7
PERSONAL SAVING RATE	8.0	7.0	6.2	6.0	5.7
US \$ PER CAN \$					
FOREIGN EXCHANGE RATE	0.930	0.930	0.930	0.930	0.930
BILLIONS OF DOLLARS					
CHANGE IN OFFICIAL INTERNATIONAL RESERVES	-0.01	0.07	0.07	0.10	0.08
CURRENT ACCOUNT BALANCE OF INTERNATIONAL PAYMENTS	-4.72	-5.84	-6.24	-6.31	-6.82
GOVERNMENT SURPLUS OR DEFICIT (ALL LEVELS)	-5.95	-4.68	-2.74	-1.56	-0.68
PERCENTAGE RATE OF GROWTH					
MONEY SUPPLY (M2)	13.5	12.5	11.5	11.5	11.5
RATIO					
VELOCITY OF MONEY	2.4	2.4	2.4	2.4	2.4

INSTITUTE FOR POLICY ANALYSIS, UNIVERSITY OF TORONTO
TRACE MODEL REFERENCE SOLUTION DECEMBER, 1977

SUMMARY OF PROJECTION (CONT.)

	1983	1984	1985	1986	1987
PERCENTAGE RATES OF GROWTH					
EMPLOYMENT	2.3	2.3	2.1	2.0	1.9
LABOUR FORCE	2.0	2.0	2.0	1.9	1.9
PER CENT					
UNEMPLOYMENT RATE	6.4	6.1	6.0	6.0	5.9
UTILISATION RATE	97.4	97.8	97.8	97.7	97.7
GOVT. OF CANADA BONDS (10 YEARS&OVER) YIELD	8.9	9.0	9.1	9.2	9.4
REAL RATE ON GOVT. BONDS	2.7	2.7	2.7	2.7	2.7
PERSONAL SAVING RATE	5.2	5.0	4.7	4.4	4.2
US \$ PER CAN \$					
FOREIGN EXCHANGE RATE	0.930	0.930	0.930	0.930	0.930
BILLIONS OF DOLLARS					
CHANGE IN OFFICIAL INTERNATIONAL RESERVES	-0.23	-0.31	-0.18	0.02	0.00
CURRENT ACCOUNT BALANCE OF INTERNATIONAL PAYMENTS	-8.03	-10.18	-11.95	-14.67	-17.25
GOVERNMENT SURPLUS OR DEFICIT (ALL LEVELS)	0.19	0.78	0.03	-0.85	-2.51
PERCENTAGE RATE OF GROWTH					
MONEY SUPPLY (M2)	11.5	11.6	11.5	11.5	11.5
RATIO					
VELOCITY OF MONEY	2.4	2.4	2.4	2.4	2.4

2.5 SOME ADDITIONAL SOLUTIONS

Although the reference solution is based on a set of assumptions which are not implausible, it is nonetheless not a forecast but simply the translation of these assumptions into the path the economy would follow, given the structure of the TRACE model, if these assumptions were realized. It may be helpful to those concerned with forecasting business conditions and those concerned with policy decisions to examine the sensitivity of the reference solution from 1979 onward to some of the assumptions and to some of the policy instruments. It should be kept in mind that the results of these experiments depend on the properties of the TRACE model. Insofar as the TRACE model does correctly represent the basic relationships in the Canadian economy, the results of these experiments then give some indication of the real world responses to alternative economic conditions. It should also be pointed out that more weight should be given to the results for the early years since the results for the latter part of the period may be unduly influenced by the lag structure of the model and the cumulation of simulation errors.

Before explaining the experiments and their results a general point should be made. In the reference solution the economy is below potential output in all years, and particularly so in the early years. Hence there is substantial room for real output to increase before potential output levels and markedly higher inflation rates are achieved. Potential output is, however, also a variable. A more vigorous economy attracts more persons into the labour force, thus making it harder to reduce the unemployment rate, and increases business capital formation. Both of these lead to higher potential output levels reducing the pressure on prices and wages below that which would exist if potential output did not increase.

The following nine additional solutions to the models were therefore performed:

- (a) changes in the economic environment
 - (1) devaluation of the Canadian dollar
 - (2) increase in exports
 - (3) increased inflow of foreign capital

- (4) improved structure of labour markets
- (5) increase in business investment
- (b) changes in economic policy
 - (6) decrease in personal income taxes
 - (7) decrease in sales taxes
 - (8) increase in federal government expenditure
 - (9) increase in the money supply

With the exception of the reference and first additional solution, all solutions of the model were performed with a floating exchange rate. Thus, the exchange rate is not considered to be a policy instrument but a variable whose value is determined by the interaction of economic forces in foreign exchange markets. Given this assumption about exchange rate flexibility, monetary policy is not therefore restricted to maintaining balance-of-payments stability. In all of the solutions, except the last one, the money supply is the same as in the reference solution. The presumption is that the Bank of Canada has selected rates of growth for the money supply which are consistent with the rate of growth in real income and the achievable rate of inflation, given the assumptions about the external economic environment.

2.5.1 Devaluation of the Canadian Dollar

To examine the sensitivity of the reference solution to the assumption concerning the exchange rate, a solution was run from 1979 - 1987 in which the Canadian dollar was devalued by 2 per cent from the reference solution level (that is, a rate of 0.912 was used). The results of the experiment for key variables are shown in Tables 2.5 - 2.12, which compare the additional solutions with the reference solution value (see pages 48-55).

In the TRACE model a change in the exchange rate feeds through the model via its impact on the prices of imports and exports and on the prices of domestically produced goods and services (both directly through the higher cost of imported goods and indirectly through the effect of these higher prices on wage rates) and via the effect on capital flows. The effect on capital flows is twofold. The

supply of some capital flows is assumed to be denominated in U.S. dollars and these respond directly to the exchange rate change. In addition, all capital flows (except for an exogenous component) respond to changes in interest rate differentials between Canada and the U.S. The increase in the expected rate of inflation and in the real rate of interest resulting from a devaluation of the Canadian dollar increases nominal Canadian interest rates and therefore widens the interest rate differential, hence, increasing the inflow of capital.

In the early years of the experiment, there is a decrease in real imports and an increase in real exports and consumption. Thus, real gross national product increases and there is a slight decline in the unemployment rate. As time passes, however, the increased cost of imported goods begins to have a significant effect on the level of domestic prices. Thus, eventually the discouraging effect on imports tends to disappear. The overall stimulative effect of the devaluation on real GNP therefore decreases in magnitude in later years. With respect to the effect on government revenues and expenditures, in the early years the stimulative effect of the devaluation on tax revenues means that the government deficit in the reference solution is reduced somewhat. In the later years, the effect of higher prices on wages and other government expenditures dominate and the deficit worsens.

2.5.2 Increased exports

The intent of this experiment was to increase real exports of goods and services by 3 per cent (before allowing for any induced effects of the increase). The assumption underlying the experiment was that world activity levels (but not foreign prices) had increased and that this had led to increased Canadian exports.

The results in the early years demonstrate the proposition that a floating exchange rate insulates a country from shocks originating abroad. The appreciation of the exchange rate (almost 3 per cent in the early years) resulting from the increased exports lowers the cost of imported goods and reduces exporters profit margins.

In terms of the actual effect on exports, the real increase is about 2.5 per cent in the first year and slowly decreases to about 2.25 per cent by 1987. An offset, in terms of the effect on real GNP, comes mainly from increased imports and decreased consumption of goods and services. The net effect is to leave real GNP and the unemployment rate virtually unchanged. Ultimately the effect of the appreciation brings about a small decrease (relative to the reference solution) in real GNP. The decrease is, however, small and may be more of a statistical phenomenon than a real decrease.

2.5.3 Increased Capital Inflow

Associated with the energy investments in the reference solution is an inflow of capital to finance them. It is of interest to see what the effect on the economy would be of a larger inflow of capital -- that is, an increased reliance upon foreign instead of domestic financing. An experiment was therefore performed in which the inflow of foreign capital was raised by \$2 billion in each year and the outflow of interest and dividends increased proportionately in each year. It is important in interpreting the results of this experiment to note that it is concerned with financing existing capital formations hence, there is no induced capital formation.¹

In terms of its impact upon the economy, the initial effect is felt through an appreciation of the Canadian dollar amounting to 3 cents in the first year. The resulting induced reduction in Canadian interest rates reduced endogenous capital flows and the amount of the appreciation is reduced in subsequent years. The increased interest and dividend flow contributes further to this reduction in the appreciation. The overall effect is to reduce real GNP and increase unemployment, mainly because of the effect on imports and on real income (and therefore on consumption). It is true that the appreciation leads to lower price levels in Canada (relative to the reference solution levels) but the decline in nominal incomes is greater, so that real incomes decline.

¹ For an interesting study of the effects of capital flows on the Canadian economy, see Caves and Reuber (1970).

2.5.4 Improved Labour Market Structure

As was indicated earlier, the reference solution assumes that approximately 6 per cent of the labour force is unemployed because of structural reasons rather than because of an insufficiency of aggregate demand. The effect of this assumption on the reference solution was tested by assuming that increased job training, improved information flows, and increased mobility reduced the proportion of the labour force unemployed as a result of structural unemployment to 4 per cent. The results of the experiment may also be of interest to policy makers concerned with the possible benefits from undertaking such labour market policies. The experiment did not, however, take into account the costs of making these labour market improvements.

In interpreting the results of this experiment it should be remembered that the improvement in the structure of the labour market does not, in itself, reduce the unemployment. It only makes it possible for macroeconomic forces to bring about a decrease. The initial impact of such an improvement in the labour market would be to reduce the degree of tightness in labour markets and to reduce (relative to the reference solution) wage rates. (In terms of the mechanics of the TRACE model, potential output is increased and the utilization ratio is lowered; hence, the upward pressure on wage rates is reduced.) This induces a lower price level, stimulating exports and discouraging imports. The impact of the early years is therefore to increase slightly real output and reduce the unemployment rate by almost one percentage point. There is a negligible effect on the foreign exchange rate in the early years.

One effect, possibly a surprising effect, is that real incomes and consumption are reduced. This is because import prices do not fall; hence, the average prices of consumer goods fall less than the prices of domestically produced goods and wages. Hence, nominal incomes fall more than do consumer prices; thus, real incomes decrease. This effect is reinforced in subsequent years by the appreciation of the Canadian dollar brought about by the decrease in imports attributable to the improved competitive position of the Canadian economy. In the later years, there is therefore a small decline (relative to the reference solution) in real

GNP. Thus, the lowering of the unemployment rate and of the domestic price level achievable through improving the structure of labour markets is attained at the cost of lowering real personal disposable income per person.

2.5.5 Increased Investment

Given that the economic and political climate in Canada has apparently been discouraging business investment, the effect of decisions to increase capital expenditures was examined. The desired stock of business capital in the form of machinery, equipment, plant and other nonresidential structures was increased by 20 per cent relative to the reference solution level. The impact was an increase in real capital formation amounting to \$1.2 billion (constant) dollars in the first year and slowly increasing, as the gap between the desired and actual capital stocks slowly closed, to \$2.7 billion (constant) dollars in the final year. All components of aggregate demand, except exports, increase in response to these increased expenditures. Exports decline slightly since the higher price level reduces their competitive position in world markets.

The effect on the exchange rate is negligible in the early years because the induced increase in capital flows to finance the expenditures tends to offset the deterioration of the current account due to higher imports and reduced exports. In later years, the effect on the trade balance dominates and the dollar depreciates tending to reinforce the stimulative effect on the economy of the increased investment. Thus, by the final year real GNP is 2 per cent above the reference solution level.

With respect to the effect on the unemployment rate, it should be noted that there are two effects which tend to offset each other. Employment is increased but so is labour force participation in response to the improved business climate, particularly in the later years. For example, by the fifth year both employment and the labour force increase by 50 thousand persons.

2.5.6 Personal Income Tax Reduction

A solution with personal income tax revenues at all levels of government

decreased by 8 per cent (before allowing for induced effects) and financed by the sale of bonds to the general public was done with the model.¹ The stimulative effects on the economy were, on the whole, rather similar to those of increased investment, although the effects on the price level were markedly lower. The tax reduction had its principal effect on consumption expenditures. Some increased investment was induced and there was no discouragement of exports, in contrast to the previous experiment. There are also significant differences in the effect on the industrial distribution of output and employment (see Chapter Three).

The effect on the government balance is, however, in sharp contrast with that of the increased investment and improved labour market experiments. Whereas the latter two experiments reduced the deficit (relative to the reference solution), the tax reductions resulted in marked increases. Although tax revenues are increased by the increased level of economic activity, the tax reductions themselves result in a net decrease in tax revenues in the early years while the higher wages and prices resulting from the expansion of the economy lead to expenditure increases and interest payments on the public debt increase.

2.5.7 Sales Tax Reduction

To see whether a reduction in sales taxes would have significantly different effects, a reduction in excise and sales taxes for all levels of government of the same magnitude as the personal income tax reduction was put through the model. The results are not significantly different. What differences do show up in national aggregates may be attributable to modelling problems rather than to real differences in the impact of the tax reductions.

2.5.8 Government Expenditure Increase

To contrast the effect of tax reductions with an increase in government expenditure on goods and services of a magnitude equal to the amount of the tax reduction, government expenditures were increased. The proportion of expenditures

1 The effect of the increased holdings of bonds by the general public upon private expenditure decisions is ignored by the model.

on wages and salaries of public servants to total government expenditure on goods and services was maintained. Hence, there was a substantial direct increase in employment so that there is a significant reduction in the unemployment rate compared with the two tax cut cases. Because the resulting increase in prices and wages from this increase in expenditure impacts heavily on the government wage bill (which is part of gross national product), the effect on the GNP price index is also very substantial. The government deficit therefore increases very markedly and the foreign exchange rate depreciates significantly in the later years.

Although the increased government expenditure has significant real output and employment effects, the fact that it generates a much higher price level than do the tax reduction stimuli suggests that it is a less desirable device for executing an expansionary fiscal policy. The economy does, however, reach potential output levels in the final years of the experiment, in contrast to the results of all the other experiments.

2.5.9 Increased Money Supply

All the preceding experiments were performed with the same money supply as in the reference solution. To see how an expansionary monetary policy would affect the economy as simulated by the TRACE model, the money supply was increased in each year by 10 per cent over the level in the reference solution. That is the rate of growth of the money supply in 1979 was 24.8 per cent instead of the 12.5 of the reference solution. In interpreting the results of this experiment, it must be kept in mind that in the reference solution, and especially in the early years, the economy is significantly below the potential output level. Hence, there are effects on the velocity of money and on real interest rates and thereby, a stimulus to the levels of investment and real output (if one accepts the modelling of these relations in the TRACE model). Some of the expansionary effects are also attributable to the resultant devaluation of the Canadian dollar which occurs as domestic prices rise. That is, the stimulative effects of the devaluation solution are achieved plus the effects of increased business investment.

Table 2.5

EFFECT ON REAL GROSS NATIONAL PRODUCT

	1979	1980	1981	1982	1983	1984	1985	1986	1987
Reference solution level (\$ 1971 billion)	133.6	140.6	148.4	155.9	163.2	170.9	178.3	185.7	193.5
	percentage difference ^a								
Additional solution									
1. Devaluation of Canadian dollar	0.6	0.5	0.5	0.4	0.4	0.3	0.3	0.3	0.3
2. Increased exports	0.0	0.0	0.0	0.0	-0.1	-0.2	-0.3	-0.4	-0.5
3. Increased capital inflow	-1.0	-0.7	-0.6	-0.6	-0.7	-0.8	-0.9	-1.0	-1.1
4. Improved labour market structure	0.0	0.2	0.2	0.1	-0.1	-0.3	-0.5	-0.7	-1.1
5. Increased business investment	0.9	1.0	0.9	1.0	1.1	1.2	1.5	1.7	2.0
6. Personal income tax reduction	0.9	0.9	0.9	1.0	1.1	1.2	1.4	1.6	1.9
7. Sales tax reduction	0.7	0.7	0.7	0.8	0.9	1.0	1.2	1.4	1.6
8. Increased federal government expenditure	1.1	0.9	0.8	1.0	1.2	1.4	1.6	1.9	2.3
9. Increased money supply	1.4	0.9	0.8	0.8	1.0	1.2	1.3	1.5	1.8

a Additional solution minus reference solution as a per cent of the latter.

Table 2.6

EFFECT ON UNEMPLOYMENT RATE

	1979	1980	1981	1982	1983	1984	1985	1986	1987
Reference solution level (per cent)	7.8	7.7	7.2	6.7	6.4	6.1	6.0	6.0	5.9
	difference in percentage points ^b								
Additional solution									
1. Devaluation of Canadian dollar	-0.2	-0.2	-0.2	-0.1	-0.1	-0.1	0.0	0.0	0.0
2. Increased exports	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1
3. Increased capital inflow	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1
4. Improved labour market structure	-0.5	-0.8	-0.9	-0.9	-0.9	-0.9	-0.9	-0.9	-0.8
5. Increased business investment	-0.2	-0.2	-0.2	-0.1	0.0	0.0	0.1	0.1	0.1
6. Personal income tax reduction	-0.1	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2
7. Sales tax reduction	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.2	-0.2
8. Increased federal government expenditure	-0.5	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.5
9. Increased money supply	-0.3	-0.3	-0.2	-0.2	-0.1	-0.1	-0.1	-0.1	-0.1

b Unemployment rate in additional solution minus rate in reference solution.

Table 2.7

EFFECT ON IMPLICIT PRICE INDEX OF GROSS NATIONAL PRODUCT

	1979	1980	1981	1982	1983	1984	1985	1986	1987
Reference solution level (1971 = 1.0)	1.95	2.08	2.20	2.33	2.48	2.65	2.82	3.02	3.23
	percentage difference ^a								
Additional solution									
1. Devaluation of Canadian dollar	0.5	0.9	1.3	1.6	1.8	2.0	2.2	2.3	2.3
2. Increased exports	-0.7	-0.1	-1.2	-1.4	-1.7	-2.1	-2.5	-2.9	-3.5
3. Increased capital inflow	-0.8	-1.2	-1.4	-1.6	-1.9	-2.2	-2.5	-2.8	-3.2
4. Improved labour market structure	-0.9	-1.4	-1.9	-2.4	-3.1	-4.0	-5.0	-6.1	-7.4
5. Increased business investment	0.1	0.5	0.9	1.4	1.8	2.4	3.0	3.7	4.4
6. Personal income tax reduction	0.0	0.1	0.3	0.6	0.9	1.3	1.9	2.5	3.3
7. Sales tax reduction	0.1	0.2	0.5	0.7	1.0	1.4	1.8	2.4	3.1
8. Increased federal government expenditure	0.7	1.1	1.6	2.2	3.0	4.0	5.2	6.4	8.0
9. Increased money supply	0.9	1.4	1.9	2.4	3.0	3.7	4.5	5.3	6.2

a Additional solution minus reference solution as a per cent of the latter.

Table 2.8

EFFECT ON IMPLICIT PRICE INDEX OF PERSONAL EXPENDITURE ON CONSUMER GOODS AND SERVICES

	1979	1980	1981	1982	1983	1984	1985	1986	1987
Reference solution level (1971 = 1.0)	1.77	1.88	1.98	2.09	2.22	2.35	2.49	2.64	2.80
	percentage difference ^a								
Additional solution									
1. Devaluation of Canadian dollar	0.4	0.7	1.0	1.3	1.5	1.7	1.9	2.0	2.1
2. Increased exports	-0.5	-0.9	-1.2	-1.4	-1.7	-2.1	-2.5	-2.9	-3.3
3. Increased capital inflow	-0.5	-1.0	-1.2	-1.4	-1.6	-1.9	-2.2	-2.4	-2.7
4. Improved labour market structure	-0.3	-0.7	-1.1	-1.5	-2.1	-2.8	-3.6	-4.6	-5.7
5. Increased business investment	0.0	0.2	0.5	0.8	1.1	1.6	2.1	2.7	3.4
6. Personal income tax reduction	0.0	0.1	0.2	0.4	0.7	1.0	1.4	2.0	2.6
7. Sales tax reduction	0.0	0.2	0.3	0.5	0.8	1.1	1.5	1.9	2.5
8. Increased federal government expenditure	0.2	0.6	0.9	1.4	2.0	2.7	3.7	4.8	6.1
9. Increased money supply	0.6	1.0	1.5	1.9	2.4	3.0	3.6	4.4	5.2

a Additional solution minus reference solution as a per cent of the latter.

Table 2.9

EFFECT ON REAL PERSONAL DISPOSABLE INCOME PER PERSON

	1979	1980	1981	1982	1983	1984	1985	1986	1987
Reference solution level (\$ 1971 thousand)	4.02	4.14	4.27	4.40	4.54	4.70	4.86	5.02	5.20
	percentage difference ^a								
Additional solution									
1. Devaluation of Canadian dollar	0.5	0.6	0.7	0.8	0.9	1.0	1.0	1.1	1.1
2. Increased exports	-0.1	-0.1	-0.0	-0.0	-0.2	-0.3	-0.5	-0.8	-1.1
3. Increased capital inflow	-0.8	-0.8	-0.8	-1.0	-1.1	-1.4	-1.6	-1.7	-2.0
4. Improved labour market structure	-1.1	-1.1	-1.3	-1.6	-2.0	-2.5	-3.1	-3.8	-4.6
5. Increased business investment	0.5	1.0	1.3	1.6	1.9	2.2	2.6	3.0	3.4
6. Personal income tax reduction	1.6	1.9	2.1	2.4	2.7	3.0	3.4	3.8	4.4
7. Sales tax reduction	1.5	1.7	1.9	2.1	2.3	2.6	2.9	3.3	3.8
8. Increased federal government expenditure	1.4	1.5	1.8	2.2	2.8	3.3	4.1	4.8	5.7
9. Increased money supply	1.0	0.9	1.1	1.3	1.6	2.0	2.4	2.8	3.3

a Additional solution minus reference solution as a per cent of the latter.

Table 2.10

EFFECT ON GOVERNMENT BALANCE (ALL LEVELS OF GOVERNMENT)

	1979	1980	1981	1982	1983	1984	1985	1986	1987
Reference solution level (\$ billion)	-4.68	-2.74	-1.56	-0.68	0.19	0.78	0.03	-0.85	-2.51
	difference ^c								
Additional solution									
1. Devaluation of Canadian dollar	0.74	0.60	0.36	0.08	-0.24	-0.54	-0.90	-1.29	-1.73
2. Increased exports	-0.34	-0.01	0.18	0.22	0.16	0.11	0.15	0.33	0.55
3. Increased capital inflow	-1.35	-0.95	-0.66	-0.58	-0.69	-0.79	-0.80	-0.61	-0.44
4. Improved labour market structure	0.63	1.22	1.66	1.95	2.13	2.39	2.76	3.42	4.16
5. Increased business investment	1.15	1.28	1.21	1.09	1.07	1.18	1.30	1.37	1.30
6. Personal income tax reduction	-1.44	-1.62	-1.92	-2.28	-2.63	-2.95	-3.32	-3.76	-4.41
7. Sales tax reduction	-1.18	-1.40	-1.68	-1.97	-2.23	-2.47	-2.78	-3.16	-3.72
8. Increased federal government expenditure	-1.33	-1.89	-2.38	-2.98	-3.58	-4.18	-5.08	-6.23	-7.65
9. Increased money supply	1.99	1.45	1.30	1.27	1.42	1.63	1.68	1.50	1.26

c Additional solution level minus reference solution level.

Table 2.11

EFFECT ON CURRENT ACCOUNT OF THE BALANCE OF INTERNATIONAL PAYMENTS

	1979	1980	1981	1982	1983	1984	1985	1986	1987
Reference solution level (\$ billion)	-5.84	-6.24	-6.31	-6.82	-8.03	-10.18	-11.95	-14.67	-17.25
	difference ^c								
Additional solution									
1. Devaluation of Canadian dollar	0.61	0.40	0.09	-0.26	-0.68	-1.11	-1.53	-1.98	-2.43
2. Increased exports	0.72	1.06	1.31	1.47	1.63	1.85	2.19	2.77	3.43
3. Increased capital inflow	-0.96	-0.58	-0.31	-0.21	-0.18	-0.10	0.05	0.42	0.78
4. Improved labour market structure	0.95	1.43	1.97	2.48	3.04	3.77	4.68	5.97	7.45
5. Increased business investment	-0.53	-1.00	-1.59	-2.22	-2.83	-3.42	-4.05	-4.84	-5.82
6. Personal income tax reduction	-0.10	-0.28	-0.60	-1.00	-1.50	-2.05	-2.71	-3.56	-4.68
7. Sales tax reduction	-0.25	-0.43	-0.71	-1.04	-1.43	-1.87	-2.43	-3.18	-4.14
8. Increased federal government expenditure	-0.96	-1.38	-1.92	-2.62	-3.46	-4.39	-5.71	-7.36	-9.37
9. Increased money supply	0.94	0.22	-0.22	-0.57	-0.88	-1.25	-1.79	-2.62	-3.57

c Additional solution level minus reference solution level.

Table 2.12

EFFECT ON FOREIGN EXCHANGE RATE

	1979	1980	1981	1982	1983	1984	1985	1986	1987
Reference solution level (U.S. \$ per Cdn. \$)	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.930
	difference ^c								
Additional solution									
1. Devaluation of the Canadian dollar	-0.018	-0.018	-0.018	-0.018	-0.018	-0.018	-0.018	-0.018	-0.018
2. Increased exports	0.028	0.027	0.027	0.030	0.035	0.041	0.046	0.051	0.057
3. Increased capital inflow	0.030	0.022	0.018	0.018	0.021	0.024	0.027	0.029	0.032
4. Improved labour market structure	0.000	-0.001	0.001	0.006	0.013	0.023	0.033	0.045	0.061
5. Increased business investment	-0.002	-0.002	-0.002	-0.003	-0.007	-0.012	-0.019	-0.026	-0.034
6. Personal income tax reduction	-0.011	-0.012	-0.012	-0.013	-0.016	-0.020	-0.025	-0.032	-0.041
7. Sales tax reduction	-0.009	-0.009	-0.010	-0.012	-0.014	-0.018	-0.023	-0.029	-0.037
8. Increased federal government expenditure	-0.002	-0.003	-0.005	-0.009	-0.016	-0.025	-0.036	-0.047	-0.062
9. Increased money supply	-0.030	-0.021	-0.020	-0.023	-0.028	-0.035	-0.042	-0.049	-0.058

c Additional solution level minus reference solution level.

Chapter Three

INDUSTRIAL OUTPUT AND EMPLOYMENT

by

D. Peter Dungan

This chapter presents projections for Ontario real provincial product¹ and employment derived from the national projections described in Chapter Two.

3.1 THE INDUSTRY-ONTARIO MODEL; A BRIEF DESCRIPTION

It is important to stress the close dependence of the provincial projections on the national simulations. The latter are provided by the TRACE model, which describes with considerable care the simultaneous behaviour of many economic "actors" when faced with a given policy and external environment. Moreover, the parameters of such behaviour are all obtained by econometric methods. There is, however, no similar model available for Ontario.² Instead, a relatively simple and straightforward procedure is used which develops a picture of the provincial economy out of the TRACE national projections in four steps:

Step 1: TRACE projections for ten categories of real final expenditure are translated into estimates of real domestic product (RDP) for 22 industries. For consistency, the estimates are required to sum to the total of real domestic product also projected by TRACE.

Step 2: Employment by industry, still at the national level, is calcu-

1 The term "output" is sometimes used in place of "real provincial product" (or "real domestic product"), especially when dealing with the individual industries. It is not meant to indicate gross output (total sales or shipments).

2 See Foot, *et al.*, pp. 11-12, for a brief analysis of efforts in this direction. The task of constructing a complete econometric model for the Province is immediately compromised by a lack of consistent provincial data - especially on inter-provincial 'trade' flows.

lated on the basis of the industrial real-product estimates. Again, the individual estimates may be rescaled so as to sum to total employment as obtained from the TRACE solution.

Step 3: Ontario real product and employment are calculated for each industry by taking the appropriate provincial share of the corresponding national product and employment estimates.¹ Ontario shares are also applied to national projections of product and employment for the government and personal sectors. The sum of product detail is then the estimate of Ontario real provincial product. Likewise, the sum of Ontario employment projections for the 22 industries, government and the personal sector gives an estimate of total Ontario employment.

Step 4: The Ontario employment estimate is matched with an estimate of the Ontario labour force obtained from a separate sub-model and an approximate projection of the Ontario unemployment rate is calculated.

This four-step procedure constitutes the "Industry-Ontario model". The procedure embodies almost no simultaneity of behaviour² and behavioural parameters, where they appear, are statistical averages rather than econometric estimates. The principal point to be kept in mind is that the model is founded on the pattern of final expenditure and the national levels of aggregate product and employment projected in the TRACE solution.

By this procedure Canada and Ontario growth patterns differ *solely* because the industrial structure of the Province differs from that of the nation as a whole. Thus, at the cost of ignoring some special features of the provincial economy,³ it has been possible to ensure complete consistency between the provincial and national projections.

1 The provincial shares (OSi) are listed in Appendix Table A3.1.

2 There is simultaneity implicit in the use of input-output tables in Step 1. The simultaneous purchase and supply of goods and services as intermediate inputs by all industries is accounted for in the matrix of coefficients employed.

3 Most of the factors which come to mind here (e.g., proximity to markets or to transportation facilities) are actually well embodied in the Ontario share coefficients.

The section immediately following considers briefly the sources of growth in the Ontario economy and the extent to which the model deals with each.¹ The main body of the Chapter presents the results generated by the model as it was applied to the Canada reference solution presented in Chapter Two. A final section examines the consequences for Ontario of each of the nine additional national solutions. The technical detail of the model is presented and analysed briefly in the Appendix to this Chapter.

3.2 SOURCES OF GROWTH

Industries grow at different rates (as measured by real product) due both to factors affecting the demand for their products or services, and to factors affecting their supply. For example: A shift in consumption towards consumer services will stimulate a higher rate of growth in the service industries or a higher rate of technical innovation or of capital formation in the Chemicals industry will increase the supply of chemicals, tend to lower their relative price and stimulate purchases.

But, in their explanation of growth, virtually all econometric models concentrate on *demand* phenomena; the Industry-Ontario model is no exception. In Step 1 of the procedure it is the aggregate expenditure level which determines aggregate real product and it is the *distribution* of expenditure growth across the different final demand categories (consumption, investment, exports, government) which determines the relative growth rates of industries (since, of course, these supply different final expenditures in different proportions).

On the supply side only minor adjustments are made to the industrial-product projections to account for relative technological and capital stock changes.²

At this level of analysis a concentration on demand factors appears to be

1 The general reader might choose to skip this discussion and proceed directly to section 3.3.

2 In terms of the description of the model in the Appendix, these adjustments are embodied in the EVAi coefficients which are obtained as the average of observed changes over 1971-76. The EVAi also include changes over time in the industry mix of the different expenditure allocations.

justified since the economy is at present operating well below capacity and, while the national projections of Chapter Two indicate some increase in capacity utilization, they also indicate that the economy is unlikely to be pushing hard against capacity over the next decade.

Given the national growth rates of industries, the causes of Ontario real-product growth can be reduced to a combination of two factors. First, industries are represented in Ontario in different proportions than in the country as a whole. As shall be seen, the projections indicate that the Ontario industrial structure is weighted somewhat more heavily to higher-growth industries; the aggregate Ontario growth rate thus tends to be somewhat higher. Second, over time industries may re-locate such that, in aggregate, Ontario gains or loses in its share of national product.¹

Unfortunately, the Industry-Ontario model does not deal with the second effect; the gradual re-location over time of individual industries is a most difficult phenomenon to model well. But, even with Ontario shares for each industry fixed through time, the *first* effect is captured fully - namely, variations between the Ontario and national growth rates resulting from Ontario's different industrial structure.

Step 2 of the Industry-Ontario model translates from product to employment projections. Consider briefly how the ratio of product to employment (measured in hours) may change: 'Neutral' technical change may occur which permits more product to be obtained from given capital and labour inputs - but which leaves the desired ratio of capital to labour unchanged. All the same, the output/employment ratio rises. Such a change has a dual effect on employment: while fewer hours are required per unit of output, more output may be sold if the relative price falls. The final employment result is, therefore, ambiguous.

Alternatively, the relative prices of capital and labour may change; the cheaper factor will be substituted for the relatively more expensive one with the adjustment - especially if it involves new capital formation - being spread out

1 As is pointed out in more detail in the Appendix, this effect may have both a long-run trend and a short-run cyclical component.

over time. The output-employment ratio will again change - but the output, relative-price and sales effects will likely be different.

Both effects are difficult to model. At least some technical innovation proceeds in discrete and erratically-spaced jumps. The substitution of capital for labour will vary with production parameters across industries and industries will vary in their perception of relative costs of factors. Finally, changes in the policy or external environment can affect the perceived and/or expected relative factor costs. Thus, for example, a policy shift decreasing the level of structural unemployment (see Chapter Two, Section 2.2.5) will tend to loosen the labour market and lower the relative price of labour. The recent increase in energy prices tended to make existing capital more expensive to use and thus raised its price relative to labour.

For purposes of making a reference projection, then, simplifications were required. The assumption made was that technical change and the substitution of capital for labour will continue in such a way that the rate of growth of the output-employment ratio for each industry will remain at the average of the last six to eight years.

To project employment by persons, rather than in hours, the average number of hours worked per week must also be considered. In most industries this has shown a steady but slow decline. Once again the average change of the last several years is projected to continue in the future.

It should be pointed out that while this procedure should give reasonable projections of the commonly-used productivity measure "output per employee" in the *long* run, it may fail to capture the considerable variation this term displays in the short run over the business cycle.¹ With good reason, employers prefer stability in the size of their work force and adjust employment gradually as output declines or accelerates. The result is that labour productivity

1 Of course, even the national solution from TRACE displays no long-run cycle, and the projections reflect this. As was pointed out at the beginning of Chapter Two, the present study does not pretend to foresee the shocks which might occur from the policy or external environment - such as could cause a repetition of the cycles observed in recent years.

cycles around its longer-term trend, falling in the recession and rising in an expansion.

Employment expansion in the nation as a whole thus depends, not only on the general rate of real product growth, but also on which sectors lead. If they are sectors in which the rate of productivity increase is generally low, or in which the rate of decline in hours worked per week is high, the employment effects will be greater than otherwise. (Naturally, there may be additional implications for labour income and wages - since low productivity usually earns a low return.)¹ Similarly, Ontario employment growth will depend not only on the growth of real product but also upon the employment characteristics of the industries in which the province specializes.

These then are the principal elements affecting product and employment growth in Ontario and a brief review of the means by which we attempt to deal with each.² Before turning to the projections themselves, it might be useful to consider the means by which long-run growth in product, employment and productivity can be improved:

First, perhaps foremost, it is important to maintain a strong level of aggregate demand as the chief driving instrument of growth. Naturally, the effects of high inflation from demand pressure must be avoided, or mitigated by creative policy.

Next, real product growth on the supply side can be improved with technological change and by increasing the available factors of production. This suggests promotion of research and development, the dissemination of information, and perhaps policies reducing the extent of structural unemployment.³ Perhaps as strongly, it suggests policies aimed at reducing artificially high costs of

1 The Industry-Ontario model is not yet equipped to examine wage formation at the industrial level.

2 Additional strengths and limitations of the model are discussed in the Appendix.

3 However, an experiment reducing structural unemployment in the national projections (Chapter Two, Section 2.5.4) gave mixed (and somewhat surprising) growth results.

capital - since capital formation both increases the stock of productive factors *and* is often required to embody or apply the results of technological innovations. By "artificial costs" are meant especially the risks to investment entailed in an environment of uncertainty about taxes, regulatory restrictions, and formal or informal incomes controls. What is important is not so much what the rules of the game are, but that they be made known and be expected to remain relatively fixed.

To the extent that capital formation increases productivity per employee *without* stimulating new production, its effect on employment growth (but *not* necessarily on returns to the employed) will be negative. However, capital formation will rarely fail to reduce costs and new products are likely to be forthcoming, with a positive impact on employment.

Finally, at the provincial level, there is the additional option of attempting to attract new, high-growth industry and investment. Most such policies can easily become the "beggar-my-neighbour" variety with respect to the other provinces and so are of little benefit in the long run. Nonetheless, the principles listed above - maintenance of demand, provision of a relatively risk-free policy environment for investment, reduction of structural unemployment and factor immobility - can all be practised at the provincial level as well as at the federal.

The TRACE model, combined with the Industry-Ontario sub-model, cannot capture all these growth-stimulation effects adequately. But some of the additional solutions described in Chapter Two and in Section 3.4 below can be used to determine approximate measures of the impacts of several growth-inducing policies.

3.3 GROWTH OF ONTARIO REAL PRODUCT AND EMPLOYMENT: THE REFERENCE SOLUTION

3.3.1 Pattern of Final Expenditure: National Industrial Projections

TRACE projections of aggregate product and employment and of the pattern of real final expenditure are the three main inputs into the Industry-Ontario

model. The first two have been presented in Table 2.4 and Chart 2.1.

It will be recalled that the national projection showed increasing real-growth rates through 1981 (but never reaching "boom" levels) with a gradual reduction thereafter and the economy approaching, but never reaching, potential output levels. The unemployment rate was projected to fall only gradually through 1980, somewhat more rapidly through 1983-84, and then to level off near 6 per cent through the middle-1980s. In this last period, the rate of inflation is also expected to increase somewhat.

The pattern of real final expenditure obtained from the reference solution is presented in Table 3.1. The ten expenditure categories displayed are those on which the Industry-Ontario model is based. The growth of total expenditure naturally follows the path described above: The average annual growth rate (at 5.2 per cent) is higher over 1977-82 than over 1982-87. Both periods surpass, but not by a great deal, the average growth of the last five years.

There are distinct, if not dramatic, differences among the expenditure categories. The share of *total* consumption is projected to grow slightly but the leading sub-category is clearly consumer services. Over 1977-82, it is the investment aggregate that shows the greatest growth rate and, hence, growth in share. This is mainly attributable to the projected increase in energy-related investment. Over 1982-87 the growth rate of investment drops considerably - but the growth of business machinery-and-equipment investment remains above the expenditure average of 4.8 per cent and its share increases. The lack of a strong outlook for Canada's trading partners (see Chapter Two, Section 2.2.2) means that exports in no way drive what growth is projected; in fact, the rate of export growth is uniformly below the expenditure average and was so also in the 1972-77 period. Finally, the share of government current expenditure is projected to decline somewhat relative to consumption and investment reflecting a continuation of present restraint.

The reference-solution projections for national levels of industrial real product and employment are presented in Tables 3.2 and 3.3. These national

Table 3.1

CANADA: DISTRIBUTION AND GROWTH RATES OF MAJOR CATEGORIES OF REAL FINAL EXPENDITURE¹

<u>Final Expenditure</u>	<u>1977 Dist (%)</u>	<u>1972-77 Growth</u>	<u>1982 Dist (%)</u>	<u>1977-82 Avg Growth (%)</u>	<u>1987 Dist (%)</u>	<u>1982-87 Growth</u>
1. Durable consumption goods	8.8	(7.8)	8.6	(4.6)	8.7	(5.0)
2. Semi-durable consumption goods	6.3	(4.5)	6.2	(4.9)	6.1	(4.4)
3. Non-durable consumption goods	15.2	(4.8)	15.3	(5.3)	15.4	(4.9)
4. Consumer services	20.3	(5.0)	21.1	(5.9)	21.8	(5.5)
Total Consumption	50.7	(5.3)	51.1	(5.4)	51.9	(5.1)
5. Business construction	8.9	(3.8)	9.2	(5.9)	8.7	(3.5)
6. Business expenditure on mach. & equip.	5.9	(5.7)	6.4	(6.8)	6.7	(5.7)
7. Government construction	2.2	(0.2)	2.1	(4.7)	2.2	(5.0)
8. Government expenditure on mach. & equip.	0.5	(10.7)	0.5	(6.1)	0.6	(6.9)
Total Investment	17.5	(4.0)	18.3	(6.2)	18.1	(4.5)
9. Exports	17.3	(3.7)	17.1	(4.9)	16.7	(4.4)
10. Government current expenditure	14.6	(3.3)	13.6	(3.7)	13.3	(4.3)
Total Expenditure	100.0	(4.5)	100.0	(5.2)	100.0	(4.8)

¹ Expenditures are measured in constant 1971 dollars. Growth rates are compound average annual percentage growth rates over the period.

Table 3.2

CANADA : REAL DOMESTIC PRODUCT BY INDUSTRY
(MILLIONS OF 1971 DOLLARS)

	1977	1978	1979	1980	1981	1982
AGRICULTURE, FISHING & TRAPPING	2455	2491	2529	2567	2605	2644
FORESTRY	704	732	763	797	837	873
MINERAL FUEL MINES & OILS	1554	1631	1705	1789	1885	1974
OTHER MINES & QUARRIES	2200	2296	2404	2524	2665	2795
FOOD, FEED, BEVERAGES & TOBACCO	3406	3570	3733	3906	4089	4263
TEXTILE & CLOTHING	1676	1752	1825	1902	1984	2061
WOOD & FURNITURE	1446	1504	1573	1644	1728	1805
PAPER & ALLIED INDUSTRIES	2946	3077	3205	3345	3504	3651
PRIMARY METAL & METAL FABRICATING	3793	3939	4155	4381	4641	4880
MOTOR VEHICLES & PARTS	2180	2333	2469	2626	2805	2980
MACHINERY & OTHER TRANSPORTATION EQUIPMENT	1818	1926	2031	2155	2289	2417
ELECTRICAL PRODUCTS CHEMICAL, RUBBER & PETROLEUM PRODUCTS	1724	1807	1891	1984	2085	2180
NON-METALLIC MINERAL PRODUCTS	2812	2995	3188	3396	3629	3859
OTHER MINERAL PRODUCTS OTHER MANUFACTURING INDUSTRIES	907	937	1000	1062	1135	1202
CONSTRUCTION	920	962	1003	1047	1096	1142
ELECTRIC POWER & GAS UTILITIES	6648	6763	7291	7769	8350	8872
	2924	3118	3321	3539	3781	4020
TOTAL : COMMERCIAL GOODS INDUSTRIES	40113	41833	44087	46435	49109	51617
TRANSPORTATION & STORAGE	6527	6883	7263	7675	8136	8577
COMMUNICATION TRADE	3502	3745	4002	4279	4583	4886
FINANCE, INSURANCE & REAL ESTATE	13032	13801	14549	15338	16208	17052
OTHER SERVICE INDUSTRIES	13229	14027	14909	15834	16831	17805
	9116	9676	10287	10935	11653	12361
TOTAL : COMMERCIAL SERVICE INDUSTRIES	45406	48131	51004	54060	57410	60681
PERSONAL SECTOR	3247	3408	3579	3759	3945	4145
GOVERNMENT SECTOR	15670	16058	16491	16975	17480	17992
TOTAL : ALL INDUSTRIES	104436	109430	115165	121229	127944	134435

CONTINUED
CANADA : REAL DOMESTIC PRODUCT BY INDUSTRY
(MILLIONS OF 1971 DOLLARS)

	1983	1984	1985	1986	1987
AGRICULTURE, FISHING & TRAPPING	2684 905	2724 938	2765 966	2807 994	2849 1021
FORESTRY					
MINERAL FUEL MINES	2057	2141	2221	2299	2379
& WELLS					
OTHER MINES & QUARRIES	2910	3028	3133	3233	3336
FOOD, FEED, BEVERAGES & TOBACCO	4426	4593	4755	4914	5079
TEXTILE & CLOTHING	2132	2206	2277	2345	2416
WOOD & FURNITURE	1870	1943	2004	2062	2122
PAPER & ALLIED INDUSTRIES	3785	3923	4051	4175	4303
PRIMARY METAL & METAL FABRICATING	5083	5306	5491	5670	5857
MOTOR VEHICLES & PARTS	3152	3334	3511	3693	3883
MACHINERY & OTHER TRANSPORTATION EQUIPMENT	2539	2668	2785	2909	3037
ELECTRICAL PRODUCTS	2265	2358	2437	2519	2603
CHEMICAL, RUBBER & PETROLEUM PRODUCTS	4082	4321	4553	4790	5040
NON - METALLIC MINERAL PRODUCTS	1257	1319	1370	1418	1468
OTHER MANUFACTURING INDUSTRIES	1183	1228	1269	1309	1351
CONSTRUCTION	9265	9740	10086	10396	10725
ELECTRIC POWER & GAS UTILITIES	4255	4504	4751	5004	5271
TOTAL : COMMERCIAL GOODS INDUSTRIES	53849	56275	58425	60537	62739
TRANSPORTATION & STORAGE	8993	9431	9846	10261	10694
COMMUNICATION	5184	5504	5822	6151	6498
TRADE	17857	18737	19574	20420	21310
FINANCE, INSURANCE & REAL ESTATE	18742	19736	20712	21697	22729
OTHER SERVICE INDUSTRIES	13049	13783	14506	15244	16020
TOTAL : COMMERCIAL SERVICE INDUSTRIES	63824	67192	70460	73773	77250
PERSONAL SECTOR	4351	4566	4797	5037	5288
GOVERNMENT SECTOR	18521	19063	19620	20195	20785
TOTAL : ALL INDUSTRIES	140546	147095	153301	159542	166062

Table 3.3
CANADA : EMPLOYMENT BY INDUSTRY
(THOUSANDS)

	1977	1978	1979	1980	1981	1982
AGRICULTURE, FISHING & TRAPPING	500 86	500 87	500 88	500 89	500 90	500 92
FORESTRY						
MINERAL FUEL MINES & WELLS	24	24	25	26	27	28
OTHER MINES & QUARRIES	166	162	159	157	155	153
FOOD, FEED, BEVERAGES & TOBACCO	269	273	274	276	279	282
TEXTILE & CLOTHING	218	220	220	220	220	221
WOOD & FURNITURE	162	162	163	164	167	169
PAPER & ALLIED INDUSTRIES	244	248	251	255	260	265
PRIMARY METAL & METAL FABRICATING	301	304	310	317	325	333
MOTOR VEHICLES & PARTS	128	131	132	134	136	139
MACHINERY & OTHER TRANSPORTATION EQUIPMENT	157	160	162	165	169	172
ELECTRICAL PRODUCTS	155	155	154	153	153	153
CHEMICAL, RUBBER & PETROLEUM PRODUCTS	156	158	160	162	165	167
NON-METALLIC MINERAL PRODUCTS	60	60	61	62	63	64
OTHER MANUFACTURING INDUSTRIES	125	127	128	130	132	134
CONSTRUCTION	616	612	643	668	700	730
ELECTRIC POWER & GAS UTILITIES	99	101	102	104	106	109
TOTAL : COMMERCIAL GOODS INDUSTRIES	3466	3484	3533	3581	3649	3712
TRANSPORTATION & STORAGE	514	520	524	529	537	544
COMMUNICATION	216	222	226	231	237	243
TRADE	1041	1075	1103	1132	1165	1200
FINANCE, INSURANCE & REAL ESTATE	285	298	311	325	340	355
OTHER SERVICE INDUSTRIES	1292	1319	1346	1374	1407	1442
TOTAL : COMMERCIAL SERVICE INDUSTRIES	3349	3434	3510	3591	3686	3785
PERSONAL SECTOR	648	680	714	750	787	827
GOVERNMENT SECTOR	2200	2295	2358	2429	2503	2576
TOTAL : ALL INDUSTRIES	9662	9893	10116	10351	10625	10900

CONTINUED
CANADA : EMPLOYMENT BY INDUSTRY
(THOUSANDS)

	1983	1984	1985	1986	1987
AGRICULTURE, FISHING & TRAPPING	500 93	500 94	500 94	500 95	500 95
FORESTRY					
MINERAL FUEL MINES & WELLS	29	30	31	32	32
OTHER MINES & QUARRIES	151	148	144	141	137
FOOD, BEVERAGES & TOBACCO	284 221	286 221	288 221	289 221	290 220
TEXTILE & CLOTHING	170	171	171	171	171
WOOD & FURNITURE					
PAPER & ALLIED INDUSTRIES	270	274	278	281	284
PRIMARY METAL & METAL FABRICATING	339	345	349	352	355
MOTOR VEHICLES & PARTS	141	143	145	147	148
MACHINERY & OTHER TRANSPORTATION EQUIPMENT	175 153	178 152	180 151	182 149	184 148
ELECTRICAL PRODUCTS CHEMICAL, RUBBER & PETROLEUM PRODUCTS	170	172	174	175	177
NON-METALLIC MINERAL PRODUCTS	65	66	66	66	66
OTHER MANUFACTURING INDUSTRIES	136 749	138 773	140 788	141 798	143 809
CONSTRUCTION					
ELECTRIC POWER & GAS UTILITIES	111	113	114	116	118
TOTAL : COMMERCIAL GOODS INDUSTRIES	3756	3803	3834	3856	3875
TRANSPORTATION & STORAGE	550 248	555 254	559 259	562 264	564 268
COMMUNICATION TRADE	1234	1269	1302	1334	1365
FINANCE, INSURANCE & REAL ESTATE	371	386	402	418	433
OTHER SERVICE INDUSTRIES	1474	1505	1535	1562	1588
TOTAL : COMMERCIAL SERVICE INDUSTRIES	3877	3969	4057	4140	4220
PERSONAL SECTOR	868	911	957	1005	1055
GOVERNMENT SECTOR	2652	2728	2806	2885	2966
TOTAL : ALL INDUSTRIES	11154	11410	11654	11887	12116

results are best discussed in comparison with the Ontario industrial projections; thus detailed comment on Tables 3.2 and 3.3 is not now presented. Note briefly, however, certain major trends. Output of Commerical Services, through 1987, is projected to increase by about 32 billion (1971) dollars while that of Commercial Goods is about 22 billion. Increase in Government is restricted to 5 billion. Employment in Services is projected to grow by 870 thousand persons - over twice the growth (409 thousand) in Commerical Services. Trade alone accounts for almost half of the Services increase. Government and Personal employment also grow considerably, despite low *output* growth in these sectors.

3.3.2 Ontario Real Product and Employment

Table 3.4 presents projections of real-product growth rates for Ontario and for Canada. In order to put the projection in context we present also the historical growth rates for 1972 through 1976 (Table 3.4A). Note that since Ontario product for each industry is projected as a constant fraction of the national product, the growth rates for Ontario and for Canada are identical at the industrial level. Growth rates differ, however, for totals and sub-totals because of the different industrial composition of the Ontario and national economies.

Levels projections for Ontario real product are not presented since historical series for this concept are not published. Levels projections for Ontario employment are presented - by industry and in total - in Table 3.5. Table 3.6 contrasts the Ontario and Canada distribution of real product across sectors and presents average growth rates over the first and second halves of the projection period. Table 3.7 performs a similar task for employment. Finally, Table 3.8 shows projections of productivity growth for Ontario and for Canada using the simple "output per employee" measure.

The reader should, of course, draw his or her own conclusions from Tables 3.4 - 3.8; the following are some of the more interesting points which the tables suggest:

Real Provincial Product:

(1) The growth-rate projection for real provincial product (RPP), not surprisingly, is quite close to that for Canada as a whole (Tables 3.4 and 3.6). Thus, the rate of growth peaks in 1981 and levels off about 1.5 percentage points lower in 1985-87, nowhere approaching the growth rate of 1973.

(2) The Ontario growth rate is uniformly 0.1 percentage points above the national average. This differential is narrowed in the last two years of the projection and is not as large as that observed for 1972 and 1973.

(3) The growth rate of the Commerical Service Industries exceeds that of the Commerical Goods Industries in all years - the result of an increasing share of services in consumer expenditure and, to a lesser extent, of the substitution of services for goods in the direct or indirect satisfaction of other expenditures.¹ The average difference is nearly a full percentage point - which, in fact, is *less* than the average difference over 1972-77.² The growth of Services in Ontario also exceeds in all years the growth of the Manufacturing sub-total of Commercial Goods.

(4) The proportion of Commercial Goods in total Product is *higher* in Ontario than in the country as a whole. Through 1987 the share of Commercial Goods in Ontario does decline absolutely - but less swiftly than it does for Canada. The disparity in the relative shares of Manufacturing is even greater but the share of Manufacturing in total product remains relatively steady through 1987; the chief source of decline for the Goods share is in the Resource Industries. Note finally that the product share of Government is somewhat lower in Ontario than for the country and that, growing at only 3 per cent per year, its share of total product declines considerably by 1987.

(5) A higher rate of growth in Services, combined with a relatively

1 These shifts are attributable to technical or compositional changes. In terms of the Appendix, they are embodied in the generally higher EVAi adjustment terms for the Commerical Services industries.

2 Although in this period Commerical Goods growth did exceed Services growth for two years (1973 and 1976).

Table 3.4A contd.

CANADA AND ONTARIO: REAL PROVINCIAL PRODUCT BY INDUSTRY - HISTORY
(per cent annual rates of growth)

	1972	1973	1974	1975	1976
Construction	2.6	5.2	4.4	0.1	2.4
Electric power & gas utilities	7.6	9.9	6.9	0.7	9.2
Total: Commercial Goods Industries	4.5	8.1	2.1	-3.5	5.0
	5.2	8.5	2.4	-3.0	5.1
Transportation & storage	6.2	8.1	4.3	-2.1	2.6
Communication	7.9	8.5	10.7	7.3	8.0
Trade	8.9	7.9	6.7	4.0	5.5
Finance, insurance & real estate	4.2	6.5	6.1	4.1	4.7
Other service industries	5.9	3.0	6.3	12.4	1.2
Total: Commercial Service Industries	6.4	6.6	6.4	3.9	4.1
	6.3	6.6	6.4	4.0	4.3
Personal and government sectors	4.0	5.7	3.8	0.0	5.7
Total: All Industries	5.2	7.0	4.2	0.3	4.8
	5.4	7.3	4.3	0.4	4.8

Table 3.4B contd.

CANADA AND ONTARIO: REAL PROVINCIAL PRODUCT BY INDUSTRY - PROJECTIONS
(per cent annual rates of growth)

	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Construction	-0.5	1.7	7.8	6.6	7.5	6.3	4.4	5.1	3.6	3.1	3.2
Electric power & gas utilities	3.8	6.6	6.5	6.6	6.8	6.3	5.8	5.9	5.5	5.3	5.3
Total: Commercial Goods Industries	0.7	4.3	5.4	5.3	5.8	5.1	4.3	4.5	3.8	3.6	3.6
Canada	1.3	4.6	5.5	5.5	5.9	5.3	4.5	4.7	4.0	3.8	3.8
Ontario											
Transportation & storage	3.0	5.5	5.5	5.7	6.0	5.4	4.9	4.9	4.4	4.2	4.2
Communication	3.5	6.9	6.9	6.9	7.1	6.6	6.1	6.2	5.8	5.7	5.6
Trade	1.5	5.9	5.4	5.4	5.7	5.2	4.7	4.9	4.5	4.3	4.4
Finance, insurance & real estate	3.0	6.0	6.3	6.2	6.3	5.8	5.3	5.3	4.9	4.8	4.8
Other service industries	3.1	6.1	6.3	6.3	6.6	6.1	5.8	5.3	5.3	5.1	5.1
Total: Commercial Service Industries	2.6	6.0	6.0	6.0	6.2	5.7	5.2	5.3	4.9	4.7	4.7
Canada	2.6	6.0	6.0	6.0	6.2	5.7	5.2	5.3	4.9	4.7	4.7
Ontario											
Personal sector	2.6	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.1	5.0	5.0
Government sector	2.6	2.5	2.7	2.9	3.0	2.9	2.9	2.9	2.9	2.9	2.9
Total: All Industries	2.2	4.8	5.2	5.3	5.5	5.1	4.5	4.7	4.2	4.1	4.1
Canada	2.3	4.9	5.3	5.4	5.6	5.2	4.6	4.7	4.3	4.1	4.1
Ontario											

Table 3.5

ONTARIO : EMPLOYMENT BY INDUSTRY
(THOUSANDS)

	1977	1978	1979	1980	1981	1982
AGRICULTURE, FISHING & TRAPPING	114 13	114 13	114 13	114 13	114 13	114 13
FORESTRY	0	0	0	0	0	0
MINERAL FUEL MINES & WELLS	55	54	53	52	52	51
OTHER MINES & QUARRIES	117 75	118 75	119 75	120 75	121 75	122 76
FOOD, FEED, BEVERAGES & TOBACCO	42	42	43	43	44	44
TEXTILE & CLOTHING	97	99	100	102	104	106
WOOD & FURNITURE	179	180	184	188	193	198
PAPER & ALLIED INDUSTRIES	113	116	117	118	120	123
PRIMARY METAL & METAL FABRICATING						
MOTOR VEHICLES & PARTS						
MACHINERY & OTHER TRANSPORTATION EQUIPMENT	94 101	96 100	97 100	99 100	101 100	103 100
ELECTRICAL PRODUCTS CHEMICAL, RUBBER & PETROLEUM PRODUCTS	88	89	90	91	93	95
NON - METALLIC OTHER MINERAL PRODUCTS	30	30	30	31	31	32
OTHER MANUFACTURING INDUSTRIES	81 217	82 215	83 226	84 235	85 247	87 257
CONSTRUCTION	34	35	35	36	36	37
ELECTRIC POWER & GAS UTILITIES						
TOTAL : COMMERCIAL GOODS INDUSTRIES	1448	1458	1479	1499	1529	1556
TRANSPORTATION & STORAGE	144 75	145 77	146 79	148 80	150 82	152 84
COMMUNICATION TRADE	417	431	442	454	467	481
FINANCE, INSURANCE & REAL ESTATE	127	132	138	144	151	158
OTHER SERVICE INDUSTRIES	471	482	491	501	514	526
TOTAL : COMMERCIAL SERVICE INDUSTRIES	1234	1267	1297	1328	1364	1401
PERSONAL SECTOR	230	241	253	266	279	294
GOVERNMENT SECTOR	825	861	884	911	939	966
TOTAL : ALL INDUSTRIES	3737	3827	3913	4004	4111	4217

CONTINUED
ONTARIO : EMPLOYMENT BY INDUSTRY
(THOUSANDS)

	1983	1984	1985	1986	1987
AGRICULTURE, FISHING & TRAPPING	114	114	114	114	114
FORESTRY	14	14	14	14	14
MINERAL FUEL MINES & WELLS	0	0	0	0	0
OTHER MINES & QUARRIES	50	49	48	47	46
FOOD, FEED, BEVERAGES & TOBACCO	123	124	125	125	125
TEXTILE & CLOTHING	76	76	76	75	75
WOOD & FURNITURE	44	45	45	45	45
PAPER & ALLIED INDUSTRIES	107	109	110	112	113
PRIMARY METAL & METAL FABRICATING	201	205	207	209	211
MOTOR VEHICLES & PARTS	125	127	128	130	131
MACHINERY & OTHER TRANSPORTATION EQUIPMENT	105	106	107	109	110
ELECTRICAL PRODUCTS	99	99	98	97	96
CHEMICAL, RUBBER & PETROLEUM PRODUCTS	96	97	98	99	100
NON - METALLIC MINERAL PRODUCTS	32	33	33	33	33
OTHER MANUFACTURING INDUSTRIES	88	89	90	91	92
CONSTRUCTION	264	272	277	281	285
ELECTRIC POWER & GAS UTILITIES	38	39	39	40	40
TOTAL : COMMERCIAL GOODS INDUSTRIES	1576	1596	1610	1620	1629
TRANSPORTATION & STORAGE	154	155	156	157	157
COMMUNICATION	86	88	90	92	93
TRADE	495	509	522	535	547
FINANCE, INSURANCE & REAL ESTATE	165	172	179	186	192
OTHER SERVICE INDUSTRIES	538	549	560	570	580
TOTAL : COMMERCIAL SERVICE INDUSTRIES	1438	1473	1507	1539	1570
PERSONAL SECTOR	308	323	340	357	375
GOVERNMENT SECTOR	994	1023	1052	1082	1112
TOTAL : ALL INDUSTRIES	4316	4415	4509	4598	4686

larger Ontario share in the *Goods* Industries would, at first glance, suggest that Ontario growth should *lag* that of the country. But the opposite is the case. The explanation is that the Ontario 'mix' of Goods industries grows uniformly faster (by over 0.2 percentage points per year) than the national average.

The Ontario-share coefficients of Appendix Table A3.1 show that Ontario is relatively less specialized in the first four major manufacturing groups ('Food and Beverages' through 'Paper, Printing and Allied') and relatively more specialized in the remainder (especially 'Primary Metals' through 'Chemicals and Rubber'). The latter group displays considerably higher output growth than the former. Recall that growth of demand for Consumer Semi-Durables and Non-Durables - which the first Manufacturing groups satisfy - is projected to be relatively weak, while Investment (especially in Machinery and Equipment) and even Consumer Durables are somewhat stronger. Ontario Manufacturing thus benefits.

Ontario also has a considerably smaller share of Resource Industries in its total product than does the country as a whole, and these industries are all projected to have relatively low rates of growth. This, combined with its concentration in higher-growth manufactures, yields the higher Ontario aggregate growth rate.

Employment and Productivity:

(1) As with real product, the growth *path* of Ontario employment follows the national closely. But while Ontario real product is uniformly above the national growth rate, there is no systematic difference in the rate of employment growth between Ontario and the nation as a whole. (See Tables 3.5 and 3.7.) From this it could be deduced that productivity in Ontario, in aggregate, must be growing faster than the national average - which Table 3.8 confirms.

(2) For employment, the place of the Service Industries in future growth is even more pronounced. This is due both to the higher rate of output growth in Services *and* to its lower rates of productivity growth (relative to the Goods Industries). Over the entire projection period the rate of growth in Services employment in Ontario is nearly double that of the Goods Industries, with the

share of each in total employment being nearly equal.

Note also that the share of Government in total employment rises over the decade even though the share of Government in total product is falling. This follows the statistical convention that there is *no* productivity growth in Government.

(3) Recall that the highest employment growth is expected in Services; yet Ontario has a lower proportion of Services in its economy than the country as a whole. How then does aggregate Ontario employment keep pace with the national rate of growth?

The answer, this time, is *not* found in the mix of Goods Industries. Table 3.7 shows that the Ontario growth rate in employment in the Commercial Goods Industries only matches the national average. Manufacturing industries of high output growth in which the Province specializes are *also* industries of high productivity growth. In the extreme, for example, output growth in Electrical Products does not even match growth in productivity and hence employment falls. However, employment growth is also low in the Manufacturing industries (5 through 8) which have a relatively lower share of Ontario employment. The additional factor keeping employment growth low in Ontario Goods industries is the impact of the negative growth of employment in 'Other Mining' - where, again, a very high rate of productivity growth outstrips expansion in product.

The reason why Ontario employment growth equals, in fact sometimes exceeds, the national level is to be found in the Ontario mix of *Service* industries. Ontario service employment is more strongly concentrated in Trade and in Finance and it is in these two sub-categories that employment increases are greatest (since productivity gains are the lowest).¹

(4) But this last point is a reminder not to concentrate excessively on employment as the sole criterion of growth. Employment in an industry where productivity is low and growing slowly is unlikely to be very remunerative to the employee. What is sought is, of course, a balance of the level of and returns

1 Of course, productivity in the Finance industry is already quite high to begin with.

Table 3.6

CANADA AND ONTARIO: DISTRIBUTION AND GROWTH OF REAL DOMESTIC PRODUCT

	1977 Distribution		Avg. Ann. Growth 1972 - 1977		1982 Distribution		Avg. Ann. Growth 1977 - 1982		1987 Distribution		Avg. Ann. Growth 1982 - 1987	
	Can.	Ont.	Can.	Ont.	Can.	Ont.	Can.	Ont.	Can.	Ont.	Can.	Ont.
1 Agriculture, fishing & trapping	2.4	1.3	-1.1		2.0	1.1	1.5		1.7	1.0	1.5	
2 Forestry	0.7	0.2	3.0		0.6	0.2	4.4		0.6	0.2	3.2	
3 Mineral fuel mines & wells	1.5	0.0	1.2		1.5	0.0	4.9		1.4	0.0	3.8	
4 Other mines & quarries	2.1	1.8	2.9		2.1	1.7	4.9		2.0	1.7	3.6	
Total: Resource Industries (1-4)	6.8	3.3	1.7	1.2	6.2	3.1	3.0	3.5	5.8	2.9	3.0	2.8
5 Food, feed, beverages & tobacco	3.3	3.5	2.8		3.2	3.4	4.6		3.1	3.3	3.6	
6 Textile & clothing	1.6	1.4	1.7		1.5	1.3	4.2		1.5	1.2	3.2	
7 Wood & furniture	1.4	0.9	2.6		1.3	0.9	4.5		1.3	0.8	3.3	
8 Paper & allied industries	2.8	2.8	1.9		2.7	2.7	4.4		2.6	2.6	3.3	
9 Primary metal & metal fabricating	3.6	5.4	2.7		3.6	5.3	5.2		3.5	5.2	3.7	
10 Motor vehicles & parts	2.1	4.6	5.0		2.2	4.9	6.5		2.3	5.1	5.4	
11 Machinery & other transport equipment	1.7	2.6	3.3		1.8	2.7	5.9		1.8	2.7	4.7	
12 Electrical products	1.7	2.7	3.3		1.6	2.6	4.8		1.6	2.5	3.6	
13 Chemical, rubber & petroleum products	2.7	3.8	5.2		2.9	4.0	6.5		3.0	4.2	5.5	
14 Non-metallic mineral products	0.9	1.1	2.5		0.9	1.1	5.8		0.9	1.1	4.1	
15 Other manufacturing industries	0.9	1.4	3.1		0.8	1.4	4.4		0.8	1.3	3.4	
Total: Manufacturing Industries (5-15)	22.6	30.1	3.1	3.3	22.6	30.3	5.2	5.4	22.4	30.1	4.1	4.2

Table 3.6 contd.

CANADA AND ONTARIO: DISTRIBUTION AND GROWTH OF REAL DOMESTIC PRODUCT

	1977		Avg. Ann. Growth 1972 - 1977		1982		Avg. Ann. Growth 1977 - 1982		1987		Avg. Ann. Growth 1982 - 1987	
	Can.	Ont.	Can.	Ont.	Can.	Ont.	Can.	Ont.	Can.	Ont.	Can.	Ont.
16 Construction	6.4	5.6		2.3		5.8		5.9		5.6		3.9
17 Electric power & gas utilities	2.8	2.4		4.7		2.5		6.6		2.7		5.6
Total: Commercial Goods Industries	38.4	41.5	2.7	3.1	38.4	41.7	5.2	5.4	37.8	41.2	4.0	4.2
18 Transportation & storage	6.2	4.4		3.9		4.4		5.6		4.5		4.5
19 Communication	3.4	2.9		5.7		3.1		6.9		3.4		5.9
20 Trade	12.5	12.5		4.9		12.6		5.5		12.7		4.6
21 Finance, insurance & real estate	12.7	14.0		4.9		14.6		6.1		15.1		5.0
22 Other service industries	8.7	8.0		4.8		8.3		6.3		8.7		5.3
Total: Commercial Service Industries	43.5	41.7	4.8	4.8	45.1	43.1	6.0	6.0	46.5	44.3	4.9	5.0
23 Personal sector	3.1	2.8		8.2		2.7		5.0		2.8		5.0
24 Government sector	15.0	14.0		2.9		12.5		2.8		11.6		2.9
Total: All Industries	100.0	100.0	3.7	3.8	100.0	100.0	5.2	5.3	100.0	100.0	4.3	4.4

Table 3.7

CANADA AND ONTARIO: DISTRIBUTION AND GROWTH OF EMPLOYMENT

	1977		Avg. Ann. Growth 1972 - 1977		1982		Avg. Ann. Growth 1977 - 1982		1987		Avg. Ann. Growth 1982 - 1987	
	Can.	Ont.	Can.	Ont.	Can.	Ont.	Can.	Ont.	Can.	Ont.	Can.	Ont.
1 Agriculture, fishing & trapping	5.2	3.1	-0.2		4.6	2.7	0.0		4.1	2.4	0.0	
2 Forestry	0.9	0.3	1.2		0.8	0.3	1.4		0.8	0.3	0.6	
3 Mineral fuel mines & wells	0.2	0.0	3.7		0.3	0.0	3.1		0.3	0.0	2.7	
4 Other mines & quarries	1.7	1.5	-1.7		1.4	1.2	-1.6		1.1	1.0	-2.2	
Total: Resource Industries (1-4)	8.0	4.9	-0.3	-0.5	7.1	4.2	-0.1	-0.4	6.3	3.7	-0.2	-0.5
5 Food, feed, beverages & tobacco	2.0	3.1	1.7		2.6	2.9	0.9		2.4	2.7	0.6	
6 Textile & clothing	2.3	2.0	1.4		2.0	1.8	0.3		1.8	1.6	-0.1	
7 Wood & furniture	1.7	1.1	1.8		1.6	1.0	0.8		1.4	1.0	0.2	
8 Paper & allied industries	2.5	2.6	2.3		2.4	2.5	1.7		2.3	2.4	1.4	
9 Primary metal & metal fabricating	3.1	4.8	2.0		3.1	4.7	2.0		2.9	4.5	1.3	
10 Motor vehicles & parts	1.3	3.0	2.3		1.3	2.9	1.7		1.2	2.8	1.3	
11 Machinery & other transport equipment	1.6	2.5	2.3		1.6	2.4	1.8		1.5	2.3	1.4	
12 Electrical products	1.6	2.7	0.8		1.4	2.4	-0.3		1.2	2.0	-0.7	
13 Chemical, rubber & petroleum products	1.6	2.4	2.2		1.5	2.3	1.4		1.5	2.1	1.2	
14 Non-metallic mineral products	0.6	0.8	1.0		0.6	0.8	1.3		0.5	0.7	0.6	
15 Other manufacturing industries	1.3	2.2	2.8		1.2	2.1	1.4		1.2	2.0	1.3	
Total: Manufacturing Industries (5-15)	20.4	27.2	1.9	1.9	19.3	25.7	1.2	1.3	18.0	24.1	0.8	0.8

Table 3.7 contd.

CANADA AND ONTARIO: DISTRIBUTION AND GROWTH OF EMPLOYMENT

	1977		Avg. Ann. Growth 1972 - 1977		1982		Avg. Ann. Growth 1977 - 1982		1987		Avg. Ann. Growth 1982 - 1987	
	Can.	Ont.	Can.	Ont.	Can.	Ont.	Can.	Ont.	Can.	Ont.	Can.	Ont.
16 Construction	6.4	5.8	2.7		6.7	6.1	3.5		6.7	6.1	2.1	
17 Electric power & gas utilities	1.0	0.9	2.9		1.0	0.9	1.9		1.0	0.9	1.6	
Total: Commercial Goods Industries	35.9	38.7	1.5	1.7	34.1	36.9	1.4	1.4	32.0	34.8	0.9	0.9
18 Transportation & storage	5.3	3.9	1.6		5.0	3.6	1.1		4.7	3.4	0.7	
19 Communication	2.2	2.0	3.0		2.2	2.0	2.4		2.2	2.0	2.0	
20 Trade	10.8	11.2	4.4		11.0	11.4	2.9		11.3	11.7	2.6	
21 Finance, insurance & real estate	2.9	3.4	5.1		3.3	3.7	4.5		3.6	4.1	4.1	
22 Other service industries	13.4	12.6	2.9		13.2	12.5	2.2		13.1	12.4	1.9	
Total: Commercial Service Industries	34.7	33.0	3.3	3.4	34.7	33.2	2.5	2.6	34.8	33.5	2.2	2.3
23 Personal sector	6.7	6.2	2.6		7.6	7.0	5.0		8.7	8.0	5.0	
24 Government sector	22.8	22.1	5.2		23.6	22.9	3.2		24.5	23.7	2.9	
Total: All Industries	100.0	100.0	3.0	3.1	100.0	100.0	2.4	2.4	100.0	100.0	2.1	2.1

Table 3.8

CANADA AND ONTARIO: PRODUCTIVITY GROWTH (OUTPUT PER EMPLOYEE)

	Average Annual Productivity Growth 1972 - 1977		Average Annual Productivity Growth 1977 - 1982		Average Annual Productivity Growth 1982 - 1987	
	Can.	Ont.	Can.	Ont.	Can.	Ont.
1 Agriculture, fishing & trapping	-1.0		1.5		1.5	
2 Forestry	1.8		3.0		2.5	
3 Mineral fuel mines & wells	-2.4		1.7		1.1	
4 Other mines & quarries	4.7		6.6		5.9	
Total: Resource Industries (1-4)	2.0	1.7	3.1	4.0	3.2	3.3
5 Food, feed, beverages & tobacco	1.0		3.6		3.0	
6 Textile & clothing	0.3		3.9		3.3	
7 Wood & furniture	0.8		3.7		3.0	
8 Paper & allied industries	-0.3		2.7		1.9	
9 Primary metal & metal fabricating	0.6		3.1		2.4	
10 Motor vehicles & parts	2.6		4.7		4.1	
11 Machinery & other transport equipment	1.0		3.9		3.3	
12 Electrical products	2.5		5.1		4.3	
13 Chemical, rubber & petroleum products	3.0		5.1		4.3	
14 Non-metallic mineral products	1.5		4.4		3.4	
15 Other manufacturing industries	0.3		3.0		2.1	
Total: Manufacturing Industries (5-15)	1.2	1.4	3.9	4.0	3.3	3.4
16 Construction	-0.4		2.4		1.8	
17 Electric power & gas utilities	1.8		4.5		3.9	
Total: Commercial Goods Industries	1.1	1.3	3.7	3.9	3.1	3.2
18 Transportation & storage	2.3		4.4		3.8	
19 Communication	2.6		4.4		3.8	
20 Trade	0.5		2.1		1.9	
21 Finance, insurance & real estate	-0.2		1.6		0.9	
22 Other service industries	1.8		4.0		3.3	
Total: Commercial Service Industries	1.4	1.4	3.4	3.3	2.7	2.6
23 Personal sector	-		-		-	
24 Government sector	-		-		-	
Total: All Industries	0.7	0.8	2.7	2.8	2.1	2.2

to employment. Nonetheless, the projections of relatively strong growth in Services employment have obvious implications for future employment counselling and education.

3.3.3 Ontario Labour Force and Unemployment Rate

The Ontario labour force projections are the product of two separate sub-models determining Ontario population and participation rates. The models are described fully in Foot, *et al.*, Chapter Three, and since they have not been modified for the present study they will not be discussed further here.

Population projections have also not changed for the present study, but participation rates have since they are in part endogenously determined by Ontario employment and income levels. It should be mentioned that the participation-rate equations have proven quite sensitive to income and employment increases and their results have been adjusted downward somewhat in the generation of the labour force projections of Table 3.9. If anything, then, the labour-force estimates are likely to err on the low side.

Table 3.9 presents the labour-force and employment projections and a comparison of Ontario and national unemployment-rate projections. The unemployment rate estimates should be taken as highly approximate - they are the residual of two other projections, both subject to error.

The basic picture painted by Table 3.9 is one in which, while Ontario employment grows as fast or faster than the national average, the labour force grows faster still - an effect attributable to a greater tendency for Ontario residents to enter the labour market under conditions of economic growth.

The result is that while the Ontario share of total employment remains relatively stable, the Ontario share of the total Canadian labour force rises. Thus the differential between the Canadian and Ontario unemployment rates closes by approximately 0.25 percentage points.

Table 3.9

ONTARIO EMPLOYMENT AND LABOUR FORCE 1976-1987¹

	Labour Force	Employment	Unemployment	Unemployment Rate Ontario	Unemployment Rate Canada	Difference (4-5)
	millions				per cent	
Historical						
1976	3.93 (38.1)	3.69 (38.5)	0.24 (32.9)	6.2	7.1	-0.98
Projected						
1977	4.02 (38.2)	3.74 (38.7)	0.28 (32.9)	7.0	8.0	-1.04
1978	4.11 (38.3)	3.83 (38.7)	0.28 (32.9)	6.9	7.9	-0.96
1979	4.20 (38.3)	3.91 (38.6)	0.29 (33.7)	6.8	7.9	-1.03
1980	4.29 (38.3)	4.00 (38.6)	0.29 (33.7)	6.7	7.7	-0.94
1981	4.39 (38.4)	4.11 (38.7)	0.28 (34.1)	6.3	7.2	-0.85
1982	4.48 (38.4)	4.22 (38.7)	0.26 (33.3)	5.9	6.7	-0.86
1983	4.57 (38.4)	4.32 (38.7)	0.25 (32.9)	5.5	6.4	-0.91
1984	4.67 (38.4)	4.42 (38.7)	0.25 (33.3)	5.4	6.1	-0.77
1985	4.76 (38.4)	4.51 (38.7)	0.25 (33.3)	5.3	6.0	-0.77
1986	4.85 (38.4)	4.60 (38.7)	0.25 (33.3)	5.1	6.0	-0.86
1987	4.94 (38.4)	4.69 (38.7)	0.25 (32.9)	5.2	5.9	-0.73

¹ Per cent of Canada total in parentheses

3.4 THE ADDITIONAL SOLUTIONS

This section examines the consequences for Ontario of the nine "Additional" solutions - reflecting different assumptions about economic policy and environment - presented in Chapter Two. Tables 3.10 through 3.13 compare "additional" and "Reference" solutions for Ontario real provincial product, labour force, employment and the unemployment rate. Table 3.14 shows how the additional solutions affect the national pattern of real final expenditure while Table 3.15 presents impacts on Ontario industrial growth rates. Table 3.16 compares 1987 employment levels by industry.

Presentation of the expenditure and industrial detail by year would have swamped the study with tables. Instead, Tables 3.14 and 3.15 present *averages* of results over 1979-87 while Table 3.16 examines changes in employment for only a single year. The use of averages, however, obscures short-run effects - as, for example, in the devaluation experiment, which yields almost all of its growth effect in 1979 (see Table 3.10). *Short-run* impacts may thus be quite different than those presented in Tables 3.14 to 3.16.

Some general observations may be made on the expenditure and industrial detail before we consider the additional solutions individually. From Table 3.14 it can be seen that much of the variation in expenditure is due to consumption - especially to consumer durables, which are quite sensitive to price and income shocks. Investment changes equal or exceed those of total consumption in only three instances: in the "Increased Investment" experiment (as would be expected), in the "Increased Capital Inflow Experiment", and through an expanded money supply (the latter lowers interest rates and the cost of capital considerably).

The only major change in exports is in the "Increased Exports" experiment. Real exports are, in the TRACE model, relatively insensitive to the exchange-rate movements which occur in several of the other experiments.

From Table 3.15 we can see that the average growth-rate impacts of the additional simulations are generally not large. Aggregate Ontario and national

effects are quite similar, but there is, nonetheless, considerable variation across sectors. Interestingly, the service industries typically show more response than do the goods industries - and this observation is still stronger for employment. The one experiment in which Goods growth matches Services is that of "Increased Investment" - as would be expected. The Resource industries generally show the smallest variation.

3.4.1 Devaluation of the Canadian Dollar

The result of a devaluation in the national solution was an initial real stimulus which was eroded by later price increases. Thus, for Ontario, the growth rate of RPP in 1979 rises from 5.3 per cent in the Reference solution to 6.05 per cent under the devaluation. In subsequent years, however, the RPP growth returns to Reference levels. Ontario employment is boosted by slightly less than one-half of one per cent (16,000 jobs in 1981) with the peak effect not occurring until two years after the devaluation. Higher price and income levels gradually raise participation rates and the labour force so that the initial reduction in the unemployment rate is eventually worn away. The effect of the devaluation in reducing the unemployment rate in Ontario is slightly greater than for the nation as a whole.

Table 3.14 shows that the greatest expenditure impact of the devaluation is in consumption - especially in consumer durables. In fact, the growth in consumer durables in 1979 is boosted by almost a full percentage point - but it tails off quickly thereafter; this is, in part, the cause of why the Motor Vehicle industry gets relatively so little product impact from the experiment (see Table 3.15). Note again the relatively greater improvement in Services over Goods - both in real product and in employment. There is a slight tendency for Ontario to gain more employment growth from the devaluation than the nation as a whole, due to its mix of Goods industries.

3.4.2 Increased Exports

An assumption of increased incomes abroad (resulting in higher Canadian exports) brought, in the national solution, an appreciation of the exchange rate,

a consequent increase in imports and reduction in consumption (due to increased prices). There was almost no change in real product or the national unemployment rate, indicating that the floating rate was providing "insulation" against foreign shocks.

However, for Ontario, as for the nation, the insulation is not complete. The growth rate of real provincial product deteriorates steadily after only a small initial stimulus and, ends, in 1987, at 3.9 per cent rather than 4.1 per cent. Ontario employment is also hurt, although poor employment prospects and lower personal income also discourage some of the labour force. By 1987, Ontario employment has declined by almost one-half of one per cent from Reference. The relative discouragement of the Ontario labour force is less than that of the nation; the Ontario unemployment rate therefore rises by 0.3 percentage points (as against 0.1 percentage points at the national level).

From Tables 3.15 and 3.16 it can be seen that the increased exports (and subsequent appreciation) have somewhat shifted output growth to the Resource industries and to Motor Vehicles and away from the other Manufactures and Services. In symmetry with the first experiment, an *appreciation* harms slightly the Ontario economy relative to the nation as a whole, despite the initial increase in exports.

3.4.3 Increased Capital Inflows

Increased capital inflows, under a floating rate, also cause appreciation, an increase in imports and a reduction, through import-price effects, of real consumption. Once again, the result is a reduction in Ontario RPP growth; the effect is quite severe in the initial year of the inflow and a "rebound" occurs in the two years following. The unemployment rate rises but follows the national rate in moving gradually back down towards Reference levels. The adverse effects on the Ontario economy are, in this case, only slightly worse than those on the economy as a whole.

As the appreciation in this experiment was caused by capital flows and not by an export increase, the adverse effect on growth and employment is more evenly distributed among the sectors.

Table 3.10

EFFECT ON GROWTH OF ONTARIO RPP

	1979	1980	1981	1982	1983	1984	1985	1986	1987
Reference solution level (per cent)	5.3	5.4	5.6	5.2	4.6	4.7	4.3	4.1	4.1
	difference in per cent growth rate								
Additional solution									
1. Devaluation of Canadian dollar	0.75	-0.07	-0.08	-0.06	-0.04	-0.03	-0.02	-0.01	-0.01
2. Increased exports	-0.08	0.13	0.03	-0.08	-0.13	-0.15	-0.14	-0.13	-0.21
3. Increased capital inflow	-1.21	0.44	0.23	0.03	-0.11	-0.11	-0.09	-0.05	-0.12
4. Improved labour market structure	0.04	0.20	0.01	-0.12	-0.24	-0.25	-0.30	-0.31	-0.47
5. Increased business investment	1.06	-0.02	-0.06	-0.02	0.11	0.19	0.25	0.28	0.30
6. Personal income tax reduction	1.00	0.04	0.03	0.06	0.14	0.19	0.23	0.28	0.31
7. Sales tax reduction	0.81	0.00	0.03	0.07	0.14	0.18	0.20	0.23	0.27
8. Increased federal government expenditure	1.20	-0.17	-0.04	0.16	0.28	0.23	0.38	0.33	0.49
9. Increased money supply	1.58	-0.57	-0.14	0.01	0.17	0.20	0.20	0.20	0.30

Table 3.11

EFFECT ON ONTARIO UNEMPLOYMENT RATE

	1979	1980	1981	1982	1983	1984	1985	1986	1987
Reference solution level (per cent)	6.8	6.7	6.3	5.9	5.5	5.4	5.3	5.1	5.2
	difference ^a								
Additional solution									
1. Devaluation of Canadian dollar	-0.17	-0.22	-0.21	-0.17	-0.14	-0.11	-0.09	-0.06	-0.04
2. Increased exports	0.07	0.08	0.07	0.09	0.12	0.17	0.21	0.25	0.29
3. Increased capital inflow	0.27	0.27	0.20	0.15	0.13	0.14	0.15	0.15	0.15
4. Improved labour market structure	-0.60	-0.79	-0.89	-0.92	-0.90	-0.85	-0.80	-0.76	-0.70
5. Increased business investment	-0.23	-0.22	-0.15	-0.07	-0.01	0.01	0.01	0.00	-0.02
6. Personal income tax reduction	-0.01	-0.08	-0.10	-0.11	-0.12	-0.15	-0.18	-0.22	-0.27
7. Sales tax reduction	0.01	-0.04	-0.06	-0.07	-0.09	-0.12	-0.15	-0.19	-0.23
8. Increased federal government expenditure	-0.38	-0.34	-0.29	-0.29	-0.33	-0.35	-0.41	-0.44	-0.50
9. Increased money supply	-0.33	-0.34	-0.27	-0.22	-0.21	-0.23	-0.25	-0.27	-0.29

a Additional solution minus reference solution as per cent of latter.

Table 3.12

EFFECT ON ONTARIO LABOUR FORCE

	1979	1980	1981	1982	1983	1984	1985	1986	1987
Reference solution level (millions of persons)	4.20	4.29	4.39	4.48	4.57	4.67	4.76	4.85	4.94
	per cent difference ^a								
Additional solution									
1. Devaluation of Canadian dollar	0.14	0.17	0.19	0.21	0.23	0.25	0.27	0.30	0.32
2. Increased exports	0.04	0.08	0.10	0.09	0.06	0.02	-0.03	-0.09	-0.18
3. Increased capital inflow	-0.22	-0.22	-0.22	-0.25	-0.30	-0.36	-0.42	-0.48	-0.56
4. Improved labour market structure	-0.15	-0.11	-0.14	-0.22	-0.35	-0.49	-0.67	-0.88	-1.15
5. Increased business investment	0.19	0.30	0.37	0.43	0.51	0.60	0.71	0.84	0.99
6. Personal income tax reduction	0.45	0.58	0.65	0.72	0.80	0.90	1.01	1.16	1.33
7. Sales tax reduction	0.40	0.49	0.55	0.60	0.68	0.76	0.86	0.99	1.13
8. Increased federal government expenditure	0.47	0.50	0.55	0.67	0.84	0.97	1.20	1.41	1.68
9. Increased money supply	0.30	0.27	0.29	0.33	0.41	0.50	0.60	0.73	0.89

a Additional solution minus reference solution as per cent of latter.

Table 3.13

EFFECT ON ONTARIO EMPLOYMENT

	1979	1980	1981	1982	1983	1984	1985	1986	1987
Reference solution level (millions of persons)	3.91	4.00	4.11	4.22	4.32	4.42	4.51	4.60	4.69
	per cent difference ^a								
Additional solution									
1. Devaluation of Canadian dollar	0.31	0.40	0.41	0.39	0.38	0.37	0.36	0.36	0.36
2. Increased exports	-0.03	-0.00	0.02	-0.00	-0.07	-0.16	-0.26	-0.36	-0.49
3. Increased capital inflow	-0.51	-0.52	-0.43	-0.40	-0.44	-0.51	-0.58	-0.64	-0.72
4. Improved labour market structure	0.50	0.74	0.80	0.75	0.60	0.41	0.18	-0.08	-0.41
5. Increased business investment	0.43	0.54	0.53	0.50	0.52	0.59	0.70	0.84	1.01
6. Personal income tax reduction	0.46	0.66	0.76	0.83	0.93	1.05	1.21	1.40	1.61
7. Sales tax reduction	0.38	0.54	0.61	0.68	0.77	0.89	1.03	1.19	1.38
8. Increased federal government expenditure	0.88	0.86	0.85	0.98	1.18	1.35	1.64	1.89	2.22
9. Increased money supply	0.65	0.64	0.58	0.57	0.63	0.74	0.87	1.01	1.20

a Additional solution minus reference solution as per cent of latter.

Table 3.14

ADDITIONAL SOLUTIONS: GROWTH RATES OF REAL FINAL EXPENDITURE

Reference solution (per cent)	Dur. Cons. Goods	Semi- Dur. Cons. Goods	Non- Dur. Cons. Goods	Cons. Serv.	Total Con- sumpt.	Bus. Con- struct.	Bus. Expend. Mach.& Equip.	Exports	Gov. Curr. Expend.	Total Expend.
	4.6	4.6	5.1	5.7	5.2	5.4	6.1	4.2	4.1	4.9
Additional solution										
difference ^a										
1. Devaluation of Canadian dollar	0.15	0.09	0.10	0.09	0.10	0.05	0.08	-0.01	0.0	0.06
2. Increased exports	-0.17	-0.06	-0.06	-0.06	-0.08	-0.04	-0.06	0.26	0.0	0.00
3. Increased capital inflow	-0.28	-0.15	-0.14	-0.15	-0.17	-0.22	-0.12	0.00	0.0	-0.12
4. Improved labour market structure	-0.70	-0.32	-0.31	-0.32	-0.38	-0.25	-0.16	0.07	0.0	-0.22
5. Increased business investment	0.48	0.24	0.24	0.24	0.28	0.65	0.99	-0.05	0.0	0.26
6. Personal income tax reduction	0.60	0.32	0.32	0.32	0.37	0.30	0.23	0.02	0.0	0.24
8. Increased federal government expenditure	0.80	0.39	0.39	0.39	0.46	0.33	0.24	-0.04	0.44	0.33
9. Increased money supply	0.48	0.23	0.23	0.23	0.27	0.37	0.37	0.00	0.0	0.20

Notes: - Growth rates are compounded annual averages, 1978-87.

a Additional solution growth rate minus reference solution growth rate.

3.4.4 Improved Labour Market Structure

As was explained in the discussion in Chapter Two (Section 2.5.4), a policy of reducing structural unemployment had rather surprising negative consequences for real incomes, due primarily to its repercussions on the current account of the balance of payments.

It was observed in the experiments above that a shift in the final expenditure mix following an appreciation (bringing lower exports and, especially, lower consumption) tended to harm the Ontario economy relatively more than the national. In the present case the same effect occurs: The growth rate of Ontario RPP is cut back by almost half of one per cent by 1987. The Ontario unemployment rate does fall, since a reduction in structural unemployment loosens the labour market and reduces the relative price of labour, stimulating employment. However, the Ontario effect is somewhat less than the national because the level of production of Ontario industries is adversely affected by the appreciation-induced expenditure swing. In fact, by 1987 Ontario employment is actually *lower* than in the Reference solution; the Ontario unemployment rate stands improved only by the fact that the labour force is a full per cent lower than Reference; participation has been considerably discouraged by the lower income levels.

From Table 3.15 we see that the sole sector gaining in growth on average through 1987 is Mining; this is because lower unit labour costs have caused exports to rise and Mining is the sector most dependent on exports for demand. Note that Food, Textiles and Finance are especially harmed - the latter pair causing the slightly poorer Ontario performance (relative to the national). The employment effects given in Table 3.16 are for 1981, the year in which the positive employment effects of the experiment peak.

3.4.5 Increased Investment

Nationally, an increase in the desired capital stock, leading to increased investment, had beneficial impacts both on product and on employment. This is true also for Ontario; in fact, the Province tends to gain slightly more from the stimulus than does the national economy. This is due to the fact that Ontario

Table 3.15

ADDITIONAL SOLUTIONS: GROWTH RATES OF REAL PRODUCT (CANADA AND ONTARIO)

Reference Solution ^a (per cent)				Additional Solutions ^b (difference)									
1 Deval.				2 Export	3 Cap.	Flow	4 Lab.	5 Invest.	6 Tax	8 Govt.	9 Mon.		
Can.	Ont.	C	0	C	0	C	0	C	0	C	0	C	0
1	Agriculture, fishing & trapping	1.5	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
2	Forestry	3.8	.02	.03	-.07		-.03	.13	.19	.13	.13	.16	
3	Mineral fuel mines & wells	4.3	.02	.03	-.07		-.04	.09	.18	.09	.14	.14	
4	Other mines & quarries	4.2	.00	.09	-.05		.03	.08	.13	.08	.06	.12	
Total: Resource Industries (1-4)				.01	.05	-.04	-.03	.00	.02	.07	.06	.11	.10
5	Food, feed, beverages & tobacco	4.0	.07	-.12	-.14		-.23	.21	.32	.33	.33	.24	
6	Textile and clothing	3.6	.07	-.14	-.16		-.26	.25	.35	.37	.37	.27	
7	Wood & furniture	3.9	.05	-.07	-.13		-.19	.33	.31	.31	.31	.29	
8	Paper & allied industries	3.8	.03	-.03	-.10		-.11	.16	.24	.23	.23	.19	
9	Primary metal & metal fabricating	4.5	.03	-.03	-.09		-.09	.30	.22	.20	.20	.23	
10	Motor vehicles & parts	5.8	.02	.03	-.09		-.07	.17	.21	.17	.17	.19	
11	Machinery & other transport equipment	5.2	.03	-.03	-.09		-.07	.39	.21	.18	.18	.23	
12	Electrical products	4.1	.06	-.11	-.13		-.19	.48	.31	.32	.32	.32	
13	Chemical, rubber & petroleum products	6.0	.05	-.08	-.12		-.17	.23	.29	.30	.30	.24	
14	Non-metallic mineral products	5.1	.04	-.09	-.10		-.14	.35	.26	.24	.24	.27	
15	Other manufacturing industries	3.8	.06	-.11	-.14		-.22	.30	.32	.35	.35	.27	
Total: Manufacturing Industries (5-15)				.04	-.06	-.12	-.11	-.15	-.14	.27	.27	.26	.26
				.04	.04	-.06	-.11	-.15	-.14	.27	.27	.26	.24
				.04	.04	-.06	-.11	-.15	-.14	.27	.27	.26	.24

Table 3.15 contd.

ADDITIONAL SOLUTIONS: GROWTH RATES OF REAL PRODUCT (CANADA AND ONTARIO)

		Reference Solution ^a (per cent)		Additional Solutions ^b (difference)															
		1 Deval.		2 Export	3 Cap.	Flow	4 Lab.	5 Invest.	6 Tax	8 Govt.	9 Mon.								
		Can.	Ont.	C	0	C	0	C	0	C	0	C	0						
16	Construction	5.3		.04		-.11		-.16		.44		.28		.29		.31			
17	Electric power & gas utilities	6.0		.06		-.13		-.19		.21		.30		.33		.23			
Total: Commercial Goods Industries		4.6	4.8	.03	.04	-.07	-.06	-.11	-.11	-.14	-.13	.24	.25	.24	.25	.22	.23		
18	Transportation & storage	5.0		.04		-.05		-.11		.21		.25		.25		.21			
19	Communication	6.3		.07		-.14		-.14		.27		.32		.36		.26			
20	Trade	4.9		.08		-.15		-.17		.33		.37		.42		.31			
21	Finance, insurance & real estate	5.5		.08		-.15		-.16		.26		.35		.37		.27			
22	Other service industries	5.8		.06		-.13		-.13		.23		.30		.37		.24			
Total: Commercial Service Industries		5.4	5.4	.07	.07	-.13	-.14	-.15	-.15	-.23	-.24	.27	.27	.33	.34	.36	.37	.27	.27
23	Personal sector	5.0		.00		.00		.00		.00		.00		.00		.00		.00	
24	Government sector	2.9		.00		.00		.00		.00		.00		.43		.00		.00	
Total: All Industries		4.7	4.8	.05	.05	-.08	-.08	-.11	-.11	-.16	-.16	.22	.23	.25	.25	.32	.32	.21	.22

Notes: a Growth Rates are compounded annual averages, 1978-87.

b Additional Solution growth rate minus reference solution growth rate.

Key to Additional Solutions: C - Canada, 0 - Ontario.

1 Deval. - Devaluation of Canadian dollar.

2 Export - Increased exports.

3 Cap. Flow - Increased capital inflow.

4 Lab. - Improved labour market structure.

5 Invest. - Increased business investment.

6 Tax - Personal income tax reduction.

8 Govt. - Increased federal government expenditure.

9 Mon. - Increased money supply.

Table 3.16 contd.

ADDITIONAL SOLUTIONS: EMPLOYMENT LEVELS, 1987 (CANADA AND ONTARIO)

		Reference Solution (thousands of persons)		Additional Solutions (per cent difference) ^a															
				1 Deval.		2 Export	3 Cap. Flow	4 Lab. (1981)	5 Invest.	6 Tax	8 Govt.	9 Mon.							
	Can.	Ont.	C	O	C	O	C	O	C	O	C	O	C	O					
16	Construction	809	285	.37	-.99	-.87	1.3	2.8	2.2	1.7	2.2	1.7	2.2	.85					
17	Electric power & gas utilities	118	40	0.0	-.85	-1.7	1.9	.85	1.7										
Total: Commercial Goods Industries		3875	1629	.39	-.44	-.45	-.83	1.1	1.2	1.5	1.9	2.0	1.4	1.4	1.6	1.7			
18	Transportation & storage	564	157	.53	-.35	-.89	1.3	.89	2.1				1.4		1.4				
19	Communication	268	93	.75	-1.1	-1.1	.84	1.5	2.6				2.2		1.9				
20	Trade	1365	547	.73	-1.2	-1.4	.94	2.0	3.2				2.9		2.3				
21	Finance, insurance & real estate	433	192	.92	-.92	-1.2	.88	1.4	3.0				2.5		2.1				
22	Other service industries	1588	580	.63	-.94	-1.1	1.1	1.1	2.5				2.5		1.7				
Total: Commercial Service Industries		4220	1570	.64	-1.0	-1.0	-1.2	1.1	1.0	1.4	2.7	2.7	2.4	2.5	1.9	1.9			
23	Personal sector	1055	1570	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
24	Government sector	2966	375	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.8	0.0	0.0				
Total: All Industries		12116	4686	.35	.36	-.48	-.49	-.69	-.72	.75	.80	.94	1.0	1.5	1.6	2.2	2.2	1.2	1.2

Notes: a Additional Solution minus Reference Solution as a per cent of the latter.

Key to Additional Solutions: see Notes to Table 3.15.

is a major supplier of investment goods, especially machinery and equipment. However, the Ontario stimulus from investment, as we show in more detail in the Appendix (section A3.3), is not as great as might be imagined, since over half of machinery and equipment investment spending "leaks" into imports or indirect taxes.

Ontario also benefits from the expenditure-pattern swings following the slight depreciation of the Canadian dollar which the increase investment eventually causes.

Thus, the rate of growth of Ontario RPP jumps by one percentage point over Reference in the first year of the stimulus, falls back to Reference levels for three years, and then begins to climb again. The reduction in the Ontario unemployment rate following the additional investment is gradually lost, not because employment falls (in fact, it keeps rising above Reference through 1987) but because considerable new labour-force participation is stimulated by higher incomes and new employment opportunities.

Table 3.15 shows the stronger growth in Machinery, Electrical Equipment and Construction brought by the new investment. Despite a slight depreciation, wage effects cause exports to decline slightly in the experiment which holds back an increase in growth in the Motor Vehicle industry.

3.4.6 Personal Income Tax Reduction

A personal income tax cut was found to be a quite powerful stimulus to the national economy; the same result holds for Ontario. The growth rate of real provincial product follows a pattern which we find also in the three succeeding experiments: It is boosted by one percentage point in the first year of the shock, falls back to Reference-solution levels for two to three years and then begins rising steadily again above the Reference. Under the tax cut the Ontario unemployment rate is gradually reduced and falls by about 0.3 percentage points by 1987. The decline, however, is not as great as that for the nation as a whole and the cause is not poorer employment creation but the greater sensitivity of the Ontario labour force to changes in personal income (which the tax cuts

immediately augment).

3.4.7 Sales Tax Reduction

As was observed for the national economy, only slight timing and scale differences distinguish the sales-tax and personal-tax reduction experiments. This experiment is thus not included in Tables 3.14 to 3.16.

3.4.8 Government Expenditure Increase

Occurring as it does in a situation of under-utilized capacity, the government expenditure increase has a considerable impact on the real growth of the national economy. The same is true for Ontario - although, of course, the effects of the policy on the national inflation rate would apply equally to the Province. This experiment produces the greatest reduction in unemployment since, in increasing all types of government expenditure proportionally, government employment is automatically increased. Once again, the Ontario unemployment-rate impact is lower than the national due to the reactions of the Ontario labour force (which, by 1987, has risen 1.7 per cent above Reference).

It is interesting to contrast the Tax and Government Expenditure experiments in Tables 3.15 and 3.16. Quite by chance, the two experiments were scaled such that the real-product effects for total Manufacturing, total Goods and total Services are almost identical. It is by adding also to the real product of government that the expenditure experiment yields higher total real growth. At the same time, under the tax experiment, all industries (except government) show *greater* employment growth than under the government expenditure policy. Since government is not also hiring, wage pressure is lessened and more workers are hired, per unit of real growth, in the private sector. Of course, the government-expenditure experiment, as scaled here, still yields a greater total employment effect, but at the cost of a considerably greater deficit in the government balance (see Table 2.10).

3.4.9 Increased Money Supply

The money-supply increase provides quite a powerful initial stimulus to

the Ontario economy. The 1979 improvement in the RPP growth rate (at 1.6 percentage points) is greater than in all prior experiments but the ratio of later, more steady growth increases to the initial impact is *lower* than for the fiscal policies. In the same fashion, the considerable initial improvement in the unemployment rate brought by the monetary policy is sustained but not further augmented in succeeding years. Employment increases less than under the fiscal policies but the impact on labour-force participation is also not as great.

Note in Tables 3.14 and 3.15 the greater impact that the monetary experiment has on investment, resulting in greater relative growth in the Producers Goods industries (Industries 9 through 13) than was true for the fiscal policies.

Appendix to Chapter Three

METHOD OF PROJECTING REAL PROVINCIAL PRODUCT AND EMPLOYMENT BY INDUSTRY

A3.1 INTRODUCTION

The basic method employed in this study for projection of industrial and provincial detail differs in no fundamental respects from that of Foot, *et al.* (1977). Implementation of the method has been improved by extending the industrial disaggregation to 22 (rather than 8) industries and by incorporating the 1971 (rather than 1966) Input-Output Tables. While the description of the procedure which follows is intended to be relatively complete, the interested reader may find additional useful detail in the earlier study (Appendix A6).

The second section of this Appendix describes in some detail the procedure employed. A third section presents an Expenditure 'Impact' Table for Ontario which incorporates all of the parameters of the method and with which the interested user can examine the effect on Ontario of his or her own expenditure scenarios. A fourth section analyses briefly the strengths and shortcomings of our method while a final section presents some limited evidence on goodness of fit.

A3.2 PROCEDURE

Our Industry-Ontario model builds from the general concept that the economy's industrial structure of production and employment is determined primarily by the level and pattern of final expenditure.¹ Thus, given our expenditure projections from TRACE, we use the Industry-Ontario model to calculate in detail the *implications* of the projection for industrial product and employment.

Note then, that the Industry-Ontario model is recursive with respect to TRACE; that is, the industrial and employment structure it calculates in no way

1 This is a property it shares with most other economy-wide simulation models in which industrial detail is distinguished - including those, like CANDIDE, in which industrial detail is determined *simultaneously* with expenditure.

feeds back to alter the TRACE national solution.¹

It is important to stress at the outset the 'demand-driven' and non-simultaneous nature of the model. Thus, for example, the different industrial and Ontario results calculated for alternative scenarios are due almost solely to the fact that these scenarios have altered the level and pattern of national final expenditure.

A3.2.1 Obtaining National Real Domestic Product by Industry

The model begins with TRACE projections of the ten categories of final expenditure listed below (TRACE mnemonics in parentheses):

- 1) Durable Consumption Goods (CD)
- 2) Semi-Durable Consumption Goods (CSD)
- 3) Non-Durable Consumption Goods (CND)
- 4) Consumer Services (CS)
- 5) Business Fixed Capital Formation - Construction (IHB + IFNB)
- 6) Business Fixed Capital Formation - Machinery and Equipment (IFMB)
- 7) Government Fixed Capital Formation - Construction (IHG + IFNG)
- 8) Government Fixed Capital Formation - Machinery and Equipment (IFMG)
- 9) Exports (less Capital Service Receipts) (X - YIDXR)
- 10) Government Current Expenditure (CG)

A first estimate of the real domestic products (RDPs) required to supply a given final demand is obtained by multiplying the expenditures from TRACE by an 'Impact' matrix prepared from the 1971 Input-Output Tables.²

Figure A3.1 is a schematic representation of the Impact matrix. The ten *columns* correspond to the ten expenditure categories listed above. The first *row* of the matrix is for Agriculture while rows 2 through 22 are for the non-agri-

1 Indeed, the model is easily made independent of TRACE and can accept expenditure projections from other sources. Ontario projections have been developed from the Institute's quarterly model, FOCUS. It might also be noted that the capability exists of making projections for provinces other than Ontario.

2 This task was performed by the Customer Service Section, Structural Analysis Division of Statistics Canada. Their prompt and efficient work is gratefully acknowledged. For a description of the Canadian Input-Output system see Statistics Canada, Cat. No. 15-506E. A detailed listing of the matrix used is available on request.

cultural business sectors we distinguish (listed, with Standard Industrial Classification Codes, in Table A3.1). Rows 23 and 24 are for the RDP of the Personal and Government sectors; row 25 is for Imports and row 26 is for Indirect Taxes (less Subsidies).

Figure A3.1

THE IMPACT MATRIX

Rows \ Columns		Expenditure Categories (10)
1	Agriculture	Impact Coefficient Matrix 'A'
2-22	Industrial Sectors; Goods and Services	
23	Personal	
24	Government	
25	Imports	
26	Indirect Taxes	
Totals:		= 1.0 for all Columns

An individual coefficient of 'A', denoted a_{ij} , expresses the proportion of final expenditure j supplied by the product of sector i . Of course, part of final expenditure can be supplied through Imports or find its way into Indirect Taxes. Note that the word 'supplied' is meant both directly and indirectly - i.e., allowing for all intermediate-input demands. Thus, for example, in the Consumer-Durables column, the coefficient $a_{10,1}$ (in the 'Motor Vehicles Industry' row) will be accounting primarily for direct purchases of autos as final expenditure. Whereas coefficient $a_{9,1}$ (in the 'Primary Metals' row) is almost as large and describes, of course, not so much *final* purchases of steel,

etc., but purchases of primary metal as *intermediate* inputs by other sectors supplying consumer durables (among them, the Motor Vehicles Industry).¹

The National Income accounting identity (equating total expenditure and total product) is exactly maintained in the Input-Output system and thus the sum of each column of coefficients is unity. That is, a dollar increase in any expenditure will lead to exactly a dollar increase in total product; the matrix tells us how the increase is distributed across the industrial RDP's, direct value added, imports and indirect taxes. (It is more customary to think of Imports as a negative 'expenditure' but the income identity is maintained if Imports are "added" to both sides. For present purposes Imports are best treated as a supply source from which final expenditures, and the intermediate demands they stimulate, are satisfied.)

Not all of the information obtainable from the Impact Matrix is used. The TRACE model itself yields projections for Imports and for Indirect Taxes superior to those which would be generated by 'A'. Exogenous to TRACE are judgmental projections for value added in Agriculture (VAA), the Personal Sector (VAP) and Government (VAG); these also are used in place of the matrix results.

The procedure thus makes use of only rows 2 through 22 of the matrix.² From these are obtained initial estimates ($\overline{VA}(i,t)$) of the real domestic product of the non-agricultural industries:

$$(A3.1) \quad \overline{VA}(i,t) = \sum_{j=1}^{10} a_{i,j} * FE(j,t) \quad \text{for } i = 2, \dots, 22$$

where $FE(j,t)$ is final expenditure of category j in year t .

This initial estimate must be adjusted in two ways. First, the

1 More technically, Impact matrix 'A' is built from the Leontief Inverse of the Input-Output sub-matrix containing intermediate-inputs coefficients.

2 In testing the model over 1971-75, using actual expenditures as inputs, it was found that the matrix results for VAP, VAG and imports were quite close to history. Agriculture was another matter; the fixed-coefficients Input-Output model simply cannot handle the variability in behaviour of this sector.

definition of Industries employed in the Input-Output system differs somewhat from that of the system of National Accounts. Most of the discrepancy is removed by applying a multiplicative correction factor ($AMVA_i$) to each industry estimate, with the factor obtained by feeding 1971 Final Expenditures into the Impact matrix and comparing results with actual 1971 RDP's.¹ The $AMVA_i$ and other model coefficients are also presented in Table A3.1.

Second, and the more serious, the results obtained from the Impact matrix are strictly valid only for 1971 - and then only on average, not necessarily at the margin. Over time technological change and relative price shifts are expected to alter the coefficients of the matrix and hence the effect on RDP's of the pattern of final expenditure. Ideally, both phenomena should have been endogenized, but this was beyond our current capabilities and/or resources. Instead, the historical paths of the 21 industrial RDP's were examined for the period 1971 through 1976 and compared with results generated by the matrix. From this comparison was developed a 'technological' correction factor (EVA_i) for each sector, the effect of which is allowed to cumulate over time. Our refined RDP estimates ($\overline{VA}(i,t)$) are:

$$(A3.2) \quad \overline{VA}(i,t) = \overline{VA}(i,t) * AMVA_i * (1 + EVA_i)^t \quad \text{for } i = 2, \dots, 22$$

where $t = 0$ in 1971, $= 1$ in 1972, etc.

Thus the assumption is made that relative-price and technical changes will continue in the future at about the average rate over 1971-76. Projection through 1987 revealed that several of the EVA_i determined in this fashion caused excessively large or small rates of growth in their respective sectors; these EVA 's were then reduced in absolute value (although without change in the ordering of sectors).²

The final $AMVA_i$ and EVA_i used are presented in Table A3.1. Note that

1 Source: Statistics Canada, Cat. No. 61-005.

2 In fact, the reader should be aware that through the entire projection procedure our 'bias' has always been to *reduce* sectoral dispersion - whether of RDP, employment or provincial shares.

Table A3.1

SECTORS AND RELATED COEFFICIENTS USED IN INDUSTRY-ONTARIO MODEL

	AMVA	EVA	BMH	PR	H	HR	OS	1970 S.I.C. Codes	
1	Agriculture, fishing & trapping	1.0	0.0	0.5499	0.0245	49.11	0.0	0.227	001-021, 041-047
2	Forestry	0.9	-0.01	0.2335	0.0254	38.53	-0.0079	0.145	031-039
3	Mineral fuel mines & wells	1.1	-0.005	0.0275	0.0045	41.86	-0.0043	0.0	061, 064
4	Other mines & quarries	0.9	-0.005	0.2000	0.0550	41.29	-0.0036	0.333	051-059, 071-099
5	Food, feed, beverages & tobacco	1.0	-0.01	0.1594	0.0285	39.22	-0.0061	0.432	101-153
6	Textile & clothing	0.95	-0.01	0.2656	0.0324	38.64	-0.0066	0.341	181-249
7	Wood & furniture	0.95	-0.01	0.2301	0.0290	39.97	-0.0064	0.260	251-268
8	Paper & allied industries	0.95	-0.01	0.1566	0.0180	39.90	-0.0058	0.396	271-289
9	Primary metal & metal fabricating	0.90	-0.005	0.1591	0.0203	40.74	-0.0037	0.591	291-309
10	Motor vehicles & parts	0.95	0.01	0.1320	0.0331	40.32	-0.0003	0.882	323-325
11	Machinery & other transport equipment	0.90	0.0	0.1858	0.0300	40.91	-0.0047	0.595	311-321, 326-329
12	Electrical products	1.0	-0.01	0.2052	0.0400	40.08	-0.0042	0.648	331-339
13	Chemical, rubber & petroleum products	1.05	0.01	0.1298	0.0400	41.09	-0.0042	0.563	162-165, 365-379
14	Non-metallic mineral products	1.0	0.0	0.1523	0.0360	42.39	-0.0068	0.494	351-359
15	Other manufacturing industries	0.95	-0.01	0.2587	0.0204	39.48	-0.0058	0.644	172-179, 391-399
16	Construction	0.80	0.0	0.1642	0.0159	38.01	-0.0059	0.351	404-421
17	Electric power & gas utilities	1.1	0.01	0.0815	0.0400	43.78	-0.0084	0.342	572-575, 577-578
18	Transportation & storage	1.1	0.0	0.1737	0.0299	40.40	0.0	0.278	501-515, 517-527
19	Communication	1.1	0.01	0.1333	0.0301	39.50	0.0	0.347	543-548
20	Trade	0.95	0.0	0.1414	0.0202	37.51	-0.0086	0.400	602-699
21	Finance, insurance & real estate	1.05	0.0	0.0345	0.0060	36.67	-0.0044	0.443	701-737
22	Other service industries ^a	0.95	0.005	0.2613	0.0310	35.03	-0.0055	0.364	516, 576, 579, 801-899
23	Personal sector							0.355	
24	Government							0.375	

a Sector 22 contains some products which, strictly speaking, are non-commercial; unfortunately, these elements could not be broken out of the Input-Output table we have used.

only for Construction (Industry 16) does the $AMVA_i$ vary from unity by more than 0.1. This reflects the fact that while the National Accounts ignore internal construction and repair by sectors (or add it to the product of the particular sector), the Input-Output system allocates all such activity to the output of Construction. The value of 0.80 for $AMVA(16)$ scales Construction (calculated under the Input-Output definition) back to levels appropriate for the National Accounts.

It was found that the EVA_i corrections could be kept within an absolute level of 1 per cent per year. The pattern of EVA's obtained suggests (and no more than 'suggests') something of a movement *against* primary inputs and most manufactures and *towards* machinery, chemicals and services, due to aggregate shifts in technology, relative prices and (a result of the latter) movements in commodity composition *within* expenditure categories.

Finally, the TRACE model provides an estimate of the total of non-agricultural business RDP (VAN in TRACE mnemonics). The $VA(i,t)$ are adjusted proportionally such that they sum to VAN.

$$(A3.3) \quad VA(i,t) * (VAN(t) / \sum_{i=2}^{22} \overline{VA(i,t)})$$

A3.2.2 National Employment by Industry

The projections for industrial employment are founded directly on the RDP estimates. To calculate total hours employed in each industry ($HM(i,t)$, in millions) we multiply the $VA(i,t)$ by the ratio of hours to $VA(i,t)$ in the base year ($BMHi$) and divide by a correction term (PR_i) expressing the rate of productivity change in years subsequent to the base:

$$(A3.4) \quad HM(i,t) = BMHi * VA(i,t) / (1 + PR_i)^t$$

where $t = 0$ in 1971, $= 1$ in 1972, etc.

The PR_i factor is intended to capture the effects of both neutral technical change and of shifts in the relative price of capital and labour (causing

changes in the capital-labour ratio). A major gap in the method, but one which would be costly to close, is that the latter effect is *not* endogenous. It must be assumed that aggregate productivity change, from whatever source, will proceed in the future at about the average rate over 1969-76.

The BMHi and PRi for each sector are also given in Table A3.1. For four sectors (Other Mines, Electrical Products, Chemicals and Power and Gas Utilities) the average PRi obtained in this fashion were so large as to yield unreasonable employment estimates over a 10-year simulation horizon; they have been judgmentally reduced to the value shown in the Table.¹

Hours worked per week, which determine, of course, the relationship of total manhours and total employment, show a distinct trend for most sectors. Thus industrial employment ($L(i,t)$, in thousands) is calculated from total hours ($HM(i,t)$), hours worked per week in the base year (H_i) and the compounded average rate of change in hours per week (HR_i):

$$(A3.5) \quad L(i,t) = HM(i,t)/H_i/(1 + HR_i)^t/0.052$$

The TRACE model's judgmental projections for employment in Agriculture and in the Personal and Government sectors are used. Moreover, the TRACE model generates projections for total employment and manhours in the non-agricultural business sector; for consistency (as with the $VA(i,t)$), the $L(i,t)$ and $HM(i,t)$ are adjusted proportionally such that they sum to these totals.

A3.2.3 Ontario Product and Employment Projections

Projections for real provincial product and employment in Ontario are obtained by applying fixed share coefficients to the national product and employment estimates. These shares (OS_i) are listed in Table A3.1.

1 Sources for the BMHi and PRi: For certain of the more aggregate sectors (Nos. 1, 2, 16, 17, 20, 21, 22) the factors were calculated from data provided by the Productivity Branch, Statistics Canada (Cat. No. 14-201, supplemented by unpublished detail). For the remaining sectors calculations had to be based on only incompletely-reconciled sources: the $VA(i,t)$ are from the National Accounts (Cat. No. 61-005) and employment and hours data are from the Labour Force Survey (Cat. No. 72-002).

There was little evidence of trend in the Ontario shares and none has been projected. It is perhaps significant that all of the OSi had to be adjusted downward somewhat (by about 2 1/2 per cent of their initially-calculated values) in order to bring total Ontario-employment calculations for 1971-76 into line with historical values. (Table A3.1 shows the OSi *after* adjustment.) The indication may be of a slight tendency towards a higher capital-labour ratio in Ontario relative to Canada as a whole (since most of the coefficients were computed from *product* shares).¹

Note finally that the appropriate OSi are also applied to the TRACE judgmental projections of real product and employment in Agriculture and the Personal and Government Sectors. The projections for *total* Ontario real product and employment are simply sums of detail across all sectors; contrary to the national projections, there is no 'outside' estimate of the aggregate to which the sum of detail is tuned.

A3.3 AN ONTARIO IMPACT TABLE

The reference and additional solutions for Ontario product and employment presented in this study are all the result of confronting the Industry-Ontario model with different sets of national final-expenditure projections. It may be useful to present a tabular summary of the model by which the interested user can estimate the approximate Ontario output and employment impacts of yet other alternative real-expenditure patterns.

Table A3.2 presents an Ontario Product and Employment 'Impact' table, as generated by our model for 1978 and for 1987. Recall that impacts obtained from

1 The sources of these coefficients again vary across sectors. For several major aggregates (Agriculture, Forestry, Mining, Electric Power, Construction) direct estimates of the provincial shares of RDP are published by Statistics Canada (Cat. No. 61-202). We have used the average share over 1969-75. Employment shares are assumed to equal product shares. Note that we assume the Ontario share of the Mineral-fuel Mining Industry to be effectively zero.

For Manufacturing, we use the provincial shares of census value added from the Census of Manufactures (Cat. No. 31-203), averaged over 1969-1974. For the service sectors we must fall back upon Ontario employment shares from the Labour Force Survey (Cat. No. 72-002), averaged over 1969-76.

Table A3.2

ONTARIO PRODUCT AND EMPLOYMENT IMPACT MATRIX

	Durable Consumption Goods (CD)			Semi-Durable Consumption Goods (CSD)			Non-Durable Consumption Goods (CN)			Consumer Services (CS)		
	1978		1987		1978		1978		1987		1978	
	RDP	Employ.	RDP	Employ.	RDP	Employ.	RDP	Employ.	RDP	Employ.	RDP	Employ.
2 Forestry	3	1	3	1	3	1	5	1	1	0	1	0
3 Mineral fuel mines & wells	0	0	0	0	0	0	0	0	0	0	0	0
4 Other mines & quarries	6	1	6	1	9	1	10	2	4	1	4	0
5 Food, feed, beverages & tobacco	9	2	8	1	10	2	482	84	29	5	27	4
6 Textile & clothing	39	11	36	8	408	116	9	2	4	1	4	1
7 Wood & furniture	69	17	63	13	9	2	4	1	4	1	4	1
8 Paper & allied industries	44	8	40	7	145	27	93	17	35	6	32	5
9 Primary metal and metal fabricating	103	18	99	15	69	12	53	9	26	4	24	4
10 Motor vehicles & parts	260	33	284	27	15	2	14	2	7	1	7	1
11 Machinery & other transport equipment	56	11	56	8	14	3	13	2	11	2	11	2
12 Electrical products	177	34	162	23	38	7	13	3	14	3	13	2
13 Chemical, rubber & petroleum products	119	14	130	11	127	15	196	23	36	4	39	3
14 Non-metallic mineral products	9	1	9	1	22	3	20	3	8	1	8	1
15 Other manufacturing industries	69	21	63	17	187	56	16	5	10	3	9	2
16 Construction	2	2	12	2	15	3	25	5	78	16	78	15
17 Electric power & gas utilities	30	2	33	2	40	3	218	16	28	2	31	2
Total: Commercial Goods Industries (excl. Agriculture)	1,005	176	1,003	136	1,109	253	1,169	175	295	51	291	42
18 Transportation & storage	73	13	73	10	91	16	113	19	123	21	123	16
19 Communication	50	7	54	6	61	8	54	7	192	26	210	22
20 Trade	851	151	851	136	940	166	628	111	93	16	93	15
21 Finance, insurance & real estate	87	4	87	4	113	5	117	6	1,466	71	1,466	70
22 Other service industries	80	25	84	21	83	26	74	23	605	188	633	157
Total: Commercial Service Industries	1,141	199	1,149	176	1,289	221	986	166	2,480	322	2,526	279
23 Personal sector	0	0	0	0	0	0	0	0	324	- ^a	324	- ^a
24 Government sector	0	0	0	0	0	0	0	0	0	0	0	0
Total: All Industries (excl. Agriculture)	2,147	375	2,153	312	2,398	474	2,155	341	3,099	373	3,141	321

Note: Impacts are for Real Expenditures of 10 million 1971 dollars; RDP Impacts are in thousands of 1971 dollars; Employment Impacts are in persons.

a Employment Impact for Personal and Government not available; Total Employment Impacts for these expenditure columns are thus net of Personal and Government Sectors.

Table A3.2 contd.

ONTARIO PRODUCT AND EMPLOYMENT IMPACT MATRIX

	Business F.C.F. Construction (IHB+IFNB)				Business F.C.F. Machinery & Equipment (IFMB)				Government F.C.F. Construction (IHG+IFNG)				Government F.C.F. Machinery & Equipment (IFMG)			
	1978		1987		1978		1987		1978		1987		1978		1987	
	RDP	Employ.	RDP	Employ.	RDP	Employ.	RDP	Employ.	RDP	Employ.	RDP	Employ.	RDP	Employ.	RDP	Employ.
2 Forestry	8	2	7	2	2	0	2	0	4	1	4	1	2	1	2	0
3 Mineral fuel mines & wells	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4 Other mines & quarries	61	10	58	6	13	2	12	1	39	6	38	4	9	1	9	1
5 Food, feed, beverages & tobacco	6	1	5	1	8	1	8	1	5	1	5	1	7	1	6	1
6 Textile & clothing	9	2	8	2	7	2	7	2	6	2	5	1	12	3	11	2
7 Wood & furniture	54	13	49	10	29	7	27	5	20	5	19	4	69	17	63	13
8 Paper & allied industries	34	6	31	5	29	5	27	4	28	5	26	4	30	5	27	4
9 Primary metal and metal fabricating	388	68	371	56	227	40	217	33	406	71	388	59	195	34	186	28
10 Motor vehicles & parts	23	3	25	2	159	20	174	17	24	3	26	2	168	21	184	18
11 Machinery & other transport equipment	40	8	40	6	350	66	350	53	46	9	46	7	279	53	279	42
12 Electrical products	94	18	86	12	331	64	302	43	73	14	66	9	125	24	114	16
13 Chemical, rubber & petroleum products	77	9	84	7	57	7	63	5	91	11	99	9	68	8	74	6
14 Non-metallic mineral products	129	19	129	14	18	3	18	2	179	26	179	20	14	2	14	2
15 Other manufacturing industries	27	8	24	6	48	14	44	12	25	7	23	6	186	56	170	45
16 Construction	1,057	217	1,057	199	10	2	10	2	1,204	248	1,204	227	9	2	9	2
17 Electric power & gas utilities	27	2	30	2	20	1	22	1	27	2	30	2	18	1	20	1
Total: Commercial Goods Industries (excl. Agriculture)	2,034	387	2,006	331	1,310	236	1,282	181	2,178	411	2,157	355	1,190	230	1,168	181
18 Transportation & storage	95	16	95	13	86	15	86	11	97	17	97	13	86	15	86	11
19 Communication	40	5	44	4	74	10	81	8	40	5	43	4	34	5	37	4
20 Trade	213	38	213	34	383	68	383	61	197	35	197	32	313	55	313	50
21 Finance, insurance & real estate	234	11	234	11	58	3	58	3	100	5	100	5	55	3	55	3
22 Other service industries	139	43	145	36	52	16	55	14	155	48	162	40	50	15	52	13
Total: Commercial Service Industries	721	114	731	98	654	111	663	97	589	110	600	94	538	93	544	81
23 Personal sector	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24 Government sector	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total: All Industries (excl. Agriculture)	2,755	501	2,737	429	1,963	348	1,945	278	2,767	521	2,757	449	1,729	323	1,712	262

Note: Impacts are for Real Expenditures of 10 million 1971 dollars; RDP Impacts are in thousands of 1971 dollars; Employment Impacts are in persons.

a Employment Impact for Personal and Government not available; Total Employment Impacts for these expenditure columns are thus *net* of Personal and Government Sectors.

Table A3.2 contd.
ONTARIO PRODUCT AND EMPLOYMENT IMPACT MATRIX

	Exports (X-Y10XR)		Government Current Expenditure	
	1978	1987	1978	1987
	ROP	Employ.	ROP	Employ.
2 Forestry	25	7	22	5
3 Mineral fuel mines & wells	0	0	0	0
4 Other mines & quarries	217	35	208	21
5 Food, feed, beverages & tobacco	79	14	73	10
6 Textile & clothing	26	7	23	5
7 Wood & furniture	53	13	48	10
8 Paper & allied industries	188	34	172	28
9 Primary metal and metal fabricating	349	61	334	50
10 Motor vehicles & parts	511	65	559	53
11 Machinery & other transport equipment	184	35	184	28
12 Electrical products	104	20	95	13
13 Chemical, rubber & petroleum products	182	22	199	17
14 Non-metallic mineral products	33	5	33	4
15 Other manufacturing industries	46	14	42	11
16 Construction	30	6	30	6
17 Electric power & gas utilities	73	5	80	4
Total: Commercial Goods Industries (excl. Agriculture)	2,099	343	2,101	267
18 Transportation & storage	251	43	251	33
19 Communication	53	7	58	6
20 Trade	232	41	232	37
21 Finance, insurance & real estate	159	8	159	8
22 Other service industries	117	36	123	30
Total: Commercial Service Industries	812	135	823	114
23 Personal sector	0	0	0	0
24 Government sector	0	0	0	0
Total: All Industries (excl. Agriculture)	2,911	478	2,924	381

Note: Impacts are for Real Expenditures of 10 million 1971 dollars; ROP Impacts are in thousands of 1971 dollars; Employment Impacts are in persons.
a Employment Impact for Personal and Government not available; Total Employment Impacts for these expenditure columns are thus *net* of Personal and Government Sectors.

the model do *not* remain fixed over time due to the structural changes implicit in the compounding of the EVA_i , PR_i and HRI factors - i.e., due to changes over time and across sectors in technology, relative prices (both of intermediates and of factors) and in hours worked per week. To give an idea of the extent of these changes over time Table A3.2 presents the results for the first and last years of our projections.

A single coefficient in the table ($A2_{ij}$) expresses the increase in RDP (in thousands of 1971 dollars), or in persons employed, in the i th industry (row) following upon an increase of 10 million (1971) dollars in national final expenditure of category j (column). Thus, for example, in column 1 of the table at row 10 we find that 10 million dollars of real expenditure on consumer durables (on a national basis) lead to real product in the Ontario Motor-Vehicle industry of 260,000 1971 dollars and 33 jobs. Recall that, as with other results from Input-Output sources, all impacts must be interpreted as 'average' in every sense, and not necessarily as occurring at the margin.

No impacts are presented for Agriculture since, as we stated above, the Input-Output analysis simply cannot handle the variability of that sector. Impacts for RDP in the Personal and Government sectors come from matrix coefficients which for national projections are overridden by the TRACE model estimates VAP and VAG; they should hence be approached with some caution. No estimate is made of employment impacts in the Personal and Government sectors.

Naturally, the sum of impacts for any column is the *total* product or employment effect on the Province of a national expenditure increase in the particular category (less any agricultural impact and the employment impacts in the Personal and Government sectors for categories 4 and 10).

Even a quick perusal of Table A3.2 yields some interesting insights. For example, the expenditure categories having the greatest employment impact in Ontario are the two Construction Investments (Business and Government), Semi-durables Consumption and Exports. (But recall that Personal and Government employment are not accounted for in the Consumer Services and Current Government categories.) For the two Investment categories there is a large impact through

direct Construction employment but there is also a wide effect through manufacturing. There is the same wide manufacturing impact for Exports while the effect through Semi-durables is much assisted by a large stimulus to Trade employment. Indeed, for all three goods-consumption categories, the share of Trade employment is always a third or above. Interestingly, the RDP and employment impacts are generally similar in rank - but not identical. The largest RDP impact is in Consumer Services, but a large portion of this is RDP for the 'Finance, Insurance and Real Estate' sector (which has a high Ontario share), but which, of all the sectors, has the lowest hours-to-RDP ratio ($BMH(21) = 0.006$). Lastly, note that while much machinery manufacturing is concentrated in Ontario, the RDP and employment impacts of the two Machinery and Equipment Investment categories are not (relatively) large; this is due to the large share of Imports (and, to some extent, of Indirect Taxes) in 'supplying' these expenditures. In fact, the Input-Output National Impact matrix shows that about 45 per cent of expenditure in these categories is accounted for by Imports and about 12 per cent by Indirect Taxes.

A3.4 STRENGTHS AND LIMITATIONS

We have found that in projecting industrial and provincial detail there is little middle ground between relatively simple techniques, such as our own, and highly complex and costly models - such as CANDIDE and its regional variant.

Yet even our simple technique embodies many of the economic relationships one can perceive as being important to the problem: the composition of output and employment depends on the composition of demand; output indirectly stimulated, through demand for intermediate goods, is accounted for through use of the Leontief Inverse matrix; provincial output and employment depend upon the extent of demand for products of sectors in which the province specializes; the employment effects of output growth are made to depend upon the interaction of rates of growth of productivity and rates of decline in hours worked per employee.

We believe, in sum, that in combination with projections from TRACE for

expenditure and for aggregate RDP and employment, the Industry-Ontario model can give a reasonable projection for the future (based on acceptable assumptions) and, especially, can provide an accurate picture of the implications of alternatives. Moreover, the technique is relatively inexpensive, and easily manipulated, adapted and comprehended.

But the model nonetheless fails to account for other relationships we believe to be also at work. To begin with the model's driving variables: it can easily be argued that our ten final-expenditure categories are still much too aggregated. Obviously, there are far different industrial and provincial implications if an increase in, say, consumer-durables spending is led by automobiles rather than by household furnishings. But this criticism remains a matter of degree; and ten categories are all that the present combination of the TRACE model and the Input-Output system can sustain.

More important, indeed perhaps the most significant omission in the model, is the failure to account for the reverse causality from 'supply' to 'demand' through the agency of prices. The determination of the expenditure pattern in TRACE depends in considerable part on a large array of relative prices. But our projections for relative-price and productivity changes across sectors (embodied in the PRi factors) in no way affect, or are coordinated with, the TRACE relative prices.

In the extreme, this leads to the anomalous result that if labour productivity is *raised* in a sector, nothing else changing, the only result is a reduction in employment in the sector. Thus a major causal effect is ignored - namely that higher productivity ought generally to lead to a lower relative price and to some increase in output - possibly even a net increase in employment.¹

Other major price effects are ignored as well. The PRi terms are exogenous and thus they are unaffected by the extent of wage gains and labour market

1 That we admit this failing is not to say that we consider the problem to be handled completely, even perhaps adequately, in CANDIDE or other large models; but at least the attempt is made, if at considerable increase in cost and complexity.

pressure or by relative wage performance across sectors; possible substitutions among intermediate inputs, and between intermediates and value-added, are also not endogenous - the Input-Output, Impact-matrix coefficients, and the AMVAi and EVAi correction factors, are all fixed.

Finally, but perhaps less seriously, there is no doubt that provincial shares are to some extent endogenous. It is not so much the longer-term trend in shares (the location of 'capital in place') that worries us (as such changes cannot occur very rapidly or erratically) but rather the fact that utilization of capacity may vary across provinces depending upon the position of the economy with respect to potential.¹ Thus, for example, in a recovery Ontario capacity might be brought back into production earlier or later, depending perhaps on the wage pressure the particular sector faces in the province as the labour market tightens.

A3.5 GOODNESS OF FIT

With a procedure of this relative simplicity, and in view of the data-reconciliation problems to be encountered, it was judged unnecessary to tune the model to the historical record at every point. Indeed there are considerable gaps and deficiencies in the record itself - especially with respect to Provincial RDP's.

Nonetheless, close attention has been paid to the model's performance over the recent historical interval (1971 through 1976) at the first and last stages of the procedure - namely in the calculation of national RDP's by sector and of total Ontario employment. After the rough adjustment of the AMVAi and EVAi factors, the RDP estimates for the 21 non-agricultural industries (*prior* to adjustment for VAN) vary from history by over 6 per cent in only 17 of the 126 relevant observations (21 industries by 6 years) and by over 10 per cent for only four observations.

1 This is a phenomenon in part accounted for in the regional version of CANDIDE. It depends, however, on the projection of capital stocks (and hence of investment) by sector - an effect beyond the resources available for this study.

Table A3.3 shows the model's performance for total Ontario employment given historical national expenditures and RDP.

Table A3.3

ONTARIO TOTAL EMPLOYMENT

(Thousands)

	Historical	Projected	Error	Per Cent
1971	3114	3110	4	0.13
1972	3248	3213	35	1.08
1973	3400	3392	8	0.24
1974	3550	3563	-13	0.37
1975	3613	3619	-6	0.17
1976	3689	3674	15	<u>0.41</u>
			Average:	0.40

As can be seen, the model performs quite tolerably in predicting aggregate Ontario employment over the 1971-76 period.

Chapter Four

ONTARIO GOVERNMENT REVENUE AND EXPENDITURE

by

John W.L. Winder

4.1 INTRODUCTION

The projections of revenues and expenditures of the Government of Ontario presented in this chapter constitute an update of those published in Chapter Five of Foot, *et al.* (1977). The Appendix to Chapter Five of that volume set forth the methodology, based on the work of Foot (1975 and 1977). Differences in methodology specific to this update are outlined in Appendix 4.1 to this chapter.

The projections are based for the most part upon econometric techniques for measurement of such relationships as that between personal income tax receipts on the one hand and tax rates and tax base on the other. Expenditure series are similarly related to various plausible explanatory variables. The relationships estimated in this way are necessarily 'historical' and, in a sense, at best descriptive of a particular period of experience. But these estimated relationships are much more sophisticated than merely 'drawing a line through' the time path of a revenue or expenditure series on a graph. The projections based on such relationships are similarly more sophisticated than mere extrapolation of past rates of growth of individual revenue or expenditure series. They lend themselves to sensitivity analysis in response to changes in underlying fundamental determinants in a way that simple extrapolations could never do.

The projections nevertheless remain very conditional, and cannot be interpreted as a 'best forecast'. They are conditional upon such things as the tax structure not being radically different in the future with respect to features

Table 4.1

GROWTH RATES OF KEY INCOME PROJECTIONS
(Average Annual Percentage Growth)

<u>Current Dollars</u>	<u>1977-82</u>	<u>1982-87</u>
Personal Income:		
Ontario	10.9	11.0
National	10.9	10.9
Personal Disposable Income:		
Ontario	10.9	11.0
National	10.9	11.0
Gross Product (at market prices):		
Ontario	11.9	11.5
National	11.8	11.4

Source: Table 2. and equations in section A5.3 of Foot, *et al.* (1977).

not explicitly accounted for by the relationships. They are conditional upon the projections of underlying determinants, principally tax bases and various measures of income. They are conditional upon assumptions that are made about tax rates, federal-provincial agreements and the like. And finally, for some categories of revenues and expenditures, the projections are essentially exogenous. That is to say, they are based on judgment or convenient assumption rather than econometric estimation, or the latter technique may be used in a purely descriptive way.

4.2 ECONOMIC BACKGROUND FOR THE PROJECTIONS

Income variables play a key role in the projections of Ontario government revenues and expenditures. Taxation revenue categories are related explicitly to the application of specific tax rates to a tax base. Revenue categories which did not lend themselves to such modelling were estimated in relation to gross provincial product. Similarly, most expenditure categories are related to personal disposable income, with the residual category tied to gross provincial product.

Before turning to the projections of the revenues and expenditures themselves, therefore, it is advisable to set the economic stage by an examination of the projections for these key income variables. Projected average annual percentage rates of growth for these income variables are presented in Table 4.1 for the two five-year periods 1977 to 1982 and 1982 to 1987.

In all cases, the provincial income variable is projected to grow at about the same rate as its national counterpart. The reason is that for lack of a model of the Ontario economy each of the provincial income variables has been determined by an estimated equation relating it to the corresponding national variable.

4.3 THE REVENUE PROJECTIONS

Projections of Ontario Government revenues to fiscal year 1987-88 are presented in Table 4.2. Values for fiscal year 1977-78 have been adjusted to correspond to the Revised Estimates published in Ontario Finances, September 30th, 1977. The adjustments to individual categories have been extended throughout the projection period in the form of a proportionate amount added or subtracted. Wherever

Table 4.2

INSTITUTE FOR POLICY ANALYSIS, UNIVERSITY OF TORONTO
ONTARIO MODEL REFERENCE SOLUTION DECEMBER, 1977

	ONTARIO GOVERNMENT REVENUES (MILLIONS OF CURRENT DOLLARS)					
	1977	1978	1979	1980	1981	1982
PERSONAL INCOME TAX	2625.	2928.	3206.	3507.	3829.	4179.
CORPORATION INCOME TAX	939.	1063.	1255.	1473.	1702.	1963.
PROPERTY TAXES	1975.	2240.	2497.	2783.	3097.	3428.
MOTOR FUEL TAX	615.	652.	682.	713.	752.	789.
OTHER TAXATION	869.	1005.	1157.	1333.	1527.	1736.
	-----	-----	-----	-----	-----	-----
TOTAL TAXATION REVENUE	7023.	7888.	8797.	9808.	10907.	12095.
OHIP PREMIUMS	815.	833.	851.	870.	892.	914.
LCRO PROFITS	326.	371.	412.	458.	510.	566.
VEHICLE REGISTRATION FEES	296.	313.	327.	341.	358.	376.
OTHER FEES AND LICENCES	212.	239.	264.	292.	323.	358.
MISCELLANEOUS OTHER REVENUE	331.	372.	416.	467.	521.	582.
	-----	-----	-----	-----	-----	-----
TOTAL OTHER REVENUE	1980.	2127.	2270.	2429.	2605.	2795.
PAYMENTS FROM FEDERAL GOVERNMENT	2046.	2278.	2521.	2782.	3085.	3424.
INTEREST ON INVESTMENTS	448.	514.	586.	671.	764.	863.
	-----	-----	-----	-----	-----	-----
TOTAL BUDGETARY REVENUE	11497.	12807.	14174.	15690.	17361.	19177.
TOTAL NON-BUDGETARY REVENUE	657.	768.	893.	1038.	1196.	1369.
	-----	-----	-----	-----	-----	-----
TOTAL REVENUE	12154.	13575.	15068.	16727.	18558.	20546.

INSTITUTE FOR POLICY ANALYSIS, UNIVERSITY OF TORONTO
 ONTARIO MODEL REFERENCE SOLUTION DECEMBER, 1977

(CONT.)

ONTARIO GOVERNMENT REVENUES
 (MILLIONS OF CURRENT DOLLARS)

	1983	1984	1985	1986	1987
PERSONAL INCOME TAX	4561.	4997.	5455.	5944.	6464.
CORPORATION INCOME TAX	2347.	2489.	2768.	3072.	3416.
RETAIL SALES TAXES	3816.	4261.	4755.	5305.	5925.
MOTOR FUEL TAX	827.	870.	914.	958.	1008.
OTHER TAXATION	1970.	2240.	2534.	2866.	3241.
	-----	-----	-----	-----	-----
TOTAL TAXATION REVENUE	13520.	14857.	16428.	18146.	20055.
OHIP PREMIUMS	935.	955.	975.	993.	1012.
LCBO PROFITS	629.	703.	784.	873.	974.
VEHICLE REGISTRATION FEES	393.	412.	432.	453.	474.
OTHER FEES AND LICENCES	394.	439.	488.	541.	602.
MISCELLANEOUS OTHER REVENUE	649.	724.	807.	899.	1003.
	-----	-----	-----	-----	-----
TOTAL OTHER REVENUE	3000.	3234.	3485.	3758.	4064.
PAYMENTS FROM FEDERAL GOVERNMENT	3804.	4221.	4683.	5199.	5772.
INTEREST ON INVESTMENTS	975.	1101.	1238.	1394.	1567.
	-----	-----	-----	-----	-----
TOTAL BUDGETARY REVENUE	21298.	23412.	25834.	28496.	31458.
TOTAL NON-BUDGETARY REVENUE	1562.	1784.	2027.	2300.	2608.
	-----	-----	-----	-----	-----
TOTAL REVENUE	22860.	25196.	27860.	30796.	34066.

Table 4.3

GROWTH RATES OF REVENUE PROJECTIONS
(Average Annual Percentage Growth)

<u>Current Dollars</u>	<u>1977-82</u>	<u>1982-87</u>
Personal Income Tax	9.7	9.1
Corporation Income Tax	15.9	11.7
Retail Sales Tax	11.7	11.6
Motive Fuel Tax	5.1	5.0
Other Taxation	<u>14.8</u>	<u>13.3</u>
Total Taxation Revenue	11.5	10.6
OHIP Premiums	2.3	2.1
LCBO Profits	11.7	11.5
Vehicle Registration Fees	4.9	4.7
Other Fees and Licences	11.0	11.0
Miscellaneous Other Revenue	<u>11.9</u>	<u>11.5</u>
Total Other Revenue	7.1	7.8
Payments from Federal Government	10.8	11.0
Interest on Investments	14.0	12.7
Total Budgetary Revenue	10.8	10.4
Total Non-Budgetary Revenue	<u>15.8</u>	<u>13.8</u>
Total Revenue	11.1	10.6

Source: Table 4.2

tax rates are included explicitly in the equations underlying the projections, the assumption is that rates are constant at 1977 levels throughout the projection period. Personal Income Tax Receipts and Payments from the Federal Government reflect the new Provincial-Federal fiscal arrangements and so are not directly comparable to these categories in Foot, *et al.* (1977). Details on these modifications are presented in the Appendix to this chapter.

Projected average annual percentage rates of growth for the various revenue categories are presented in Table 4.3 for the two consecutive five-year periods 1977 to 1982 and 1982 to 1987. The relative differences among growth rates across revenue categories are essentially the same as reported in Foot, *et al.* (1977), inasmuch as the same equations have been used to generate the projections. Payments from the Federal Government grow relatively faster in the updated projection. Growth rates overall are higher and fall off less noticeably in the last half of the decade compared to the projections in Foot, *et al.* (1977), reflecting the changes in the reference solution for the national economy, including the higher rate of inflation. Even so, the projected growth rates for total revenue may be understated as a result of the proportionate adjustment procedure. In section 4.5 this point is developed further.

Non-budgetary revenue grows at above average rates but is not sufficiently important as a revenue source to substantially influence the rate of growth of total revenue. Retail sales tax revenues grow at rates between those projected for personal income and gross provincial product, somewhat in excess of projected rates of growth for personal disposable income to which retail sales have been linked. OHIP premiums grow in pace with provincial employment. Vehicle registration fees and motive fuel tax revenues are linked to real disposable income via motor vehicle registrations and so follow the growth rates for the former.

Personal income tax revenues are projected at rates of growth which fall short of the projected rates of growth in personal income, reflecting the joint effect of the indexation of the tax-rate and exemption-level structure for inflation and Ontario's tax credit program.

Table 4.4

INSTITUTE FOR POLICY ANALYSIS, UNIVERSITY OF TORONTO
ONTARIO MODEL REFERENCE SOLUTION DECEMBER, 1977

ONTARIO GOVERNMENT EXPENDITURES
(MILLIONS OF CURRENT DOLLARS)

	1977	1978	1979	1980	1981	1982
HEALTH	3640.	4162.	4658.	5251.	5947.	6726.
EDUCATION	3500.	4023.	4473.	4942.	5438.	5978.
TREASURY, ECONOMICS AND INTERGOVERNMENTAL AFFAIRS	423.	459.	549.	700.	912.	1181.
TRANSPORTATION AND COMMUNICATION	1022.	1172.	1322.	1500.	1802.	2012.
COMMUNITY AND SOCIAL SERVICES	1157.	1299.	1429.	1584.	1758.	1951.
PUBLIC DEPT- INTEREST	1037.	1184.	1321.	1485.	1680.	1896.
ALL OTHER BUDGETARY AND NON-BUDGETARY	2827.	3184.	3580.	4029.	4524.	5060.
	-----	-----	-----	-----	-----	-----
TOTAL EXPENDITURES	13606.	15483.	17334.	19491.	22063.	24804.
NET CASH REQUIREMENTS	1452.	1908.	2266.	2763.	3506.	4258.
GROSS PROVINCIAL PRODUCT (\$ BILLIONS)	84.39	94.55	106.02	118.95	133.12	148.39

INSTITUTE FOR POLICY ANALYSIS, UNIVERSITY OF TORONTO
ONTARIO MODEL REFERENCE SOLUTION DECEMBER, 1977

C (CONT.)

ONTARIO GOVERNMENT EXPENDITURES
(MILLIONS OF CURRENT DOLLARS)

	1983	1984	1985	1986	1987
HEALTH	7627.	8692.	9907.	11300.	12926.
EDUCATION	6578.	7247.	8015.	8867.	9851.
TREASURY, ECONOMICS AND INTERGOVERNMENTAL AFFAIRS	1509.	1910.	2386.	2946.	3608.
TRANSPORTATION AND COMMUNICATION	2262.	2550.	3033.	3395.	3814.
COMMUNITY AND SOCIAL SERVICES	2173.	2443.	2749.	3098.	3514.
PUBLIC DEPT- INTEREST	2147.	2443.	2782.	3167.	3620.
ALL OTHER BUDGETARY AND NON-BUDGETARY	5659.	6347.	7099.	7946.	8902.
	-----	-----	-----	-----	-----
TOTAL EXPENDITURES	27954.	31631.	35971.	40719.	46234.
NET CASH REQUIREMENTS	5094.	6435.	8110.	9923.	12168.
GROSS PROVINCIAL PRODUCT (\$ BILLIONS)	165.30	184.66	205.64	229.13	255.51

Table 4.5

GROWTH RATES OF EXPENDITURE PROJECTIONS
(Average Annual Percentage Growth)

<u>Current Dollars</u>	<u>1977-82</u>	<u>1982-87</u>
Health	13.1	14.0
Education	11.3	10.5
Treasury, Economics and Intergovernmental Affairs	22.8	25.0
Transportation and Communications	14.5	13.6
Community and Social Services	11.0	12.5
Public Debt Interest	12.8	13.8
All Other Budgetary and Non-Budgetary	12.3	12.0
Total Expenditures	12.8	13.3

Source: Table 4.4

4.4 THE EXPENDITURE PROJECTIONS

Projections of Ontario Government expenditures to fiscal year 1987-88 are presented in Table 4.4. Values for fiscal year 1977-78 have been adjusted to correspond to the Revised Estimates published in Ontario *Finances*, September 30th, 1977. The adjustments to individual categories have been incorporated throughout the projection period in accordance with the technical requirements of individual estimating equations. As pointed out in Foot, *et al.* (1977, p. 187), Foot (1977) assigned to Treasury, Economics and Intergovernmental Affairs (TEIA) a functional role beyond that reflected in published figures for the budgetary expenditures of that Ministry. In Foot, *et al.* (1977), a partial reconciliation was achieved by equating TEIA debt transactions to interest on the public debt and allowing TEIA development loans to be subsumed in the residual category All Other Budgetary and Non-Budgetary Expenditure. In this update an attempt has been made to achieve a more complete reconciliation by re-classifying such other expenditures as pension fund payments as well. Thus in this update, the categories TEIA and All Other Budgetary and Non-Budgetary Expenditure are not individually comparable to those in Foot, *et al.* (1977); only the sum of the two categories is directly comparable.

Projected average annual percentage rates of growth for the various expenditure categories are presented in Table 4.5 for the two consecutive five-year periods 1977 to 1982 and 1982 to 1987. As was the case with revenues, growth rates are higher for all expenditure categories compared to those published in Foot, *et al.* (1977), reflecting the changes in the reference solution for the national economy, including the higher rate of inflation.

It was noted in Foot, *et al.* (1977, p. 205), that projected growth rates for TEIA were obviously high in relation to anything else. This discrepancy is even more pronounced in Table 4.5 in spite of attempts to adjust for it, as described in Appendix 4.1 to this chapter. The further reconciliation attempted in this update between Foot's (1977) functional assignment to TEIA and published budgetary expenditures for the Ministry, referred to above, does not really affect the growth rate. The reason is that, as stated in Foot, *et al.* (1977,

Table 4.6

IMPLICATIONS OF ALTERNATIVE ASSUMPTIONS

I. Budget Implications

	(millions of dollars)	
	<u>1982</u>	<u>1987</u>
TEIA	758	1358
Total Expenditure	24381	43984
Total Revenue	21572	36792
Net Cash Requirements	2809	7192

II. Implications for Growth Rates

	(average annual percentage growth)	
	<u>1977-82</u>	<u>1982-87</u>
Total Expenditure	12.4	12.5
Total Revenue	12.2	11.3

p. 206), examination of the TEIA sub-categories of Foot (1977) revealed that growth rates for each were virtually identical over all reported intervals. The projections for TEIA in Tables 4.4 and 4.5 are implausibly high, and are reconsidered in section 4.5 following.

4.5 IMPLICATIONS FOR NET CASH REQUIREMENTS

Net cash requirements amount to the excess of total (budgetary and non-budgetary) expenditures over total (budgetary and non-budgetary) revenues. As projected here (and consistent with current Provincial reporting practice) net cash requirements are for purely Provincial financial purposes. More specifically, borrowing on behalf of Ontario Hydro is excluded.

As a matter of arithmetic alone, net cash requirements will of course grow even when total revenues and total expenditures grow at some common rate. Cash requirements will also grow at that common rate. When expenditures grow faster than revenues, net cash requirements grow at disproportionately high rates. Because of this high sensitivity of net cash requirements to the differential in rates of growth of revenues and expenditures, it is prudent to consider the implications of some alternative assumptions.

In this update, the rate of growth of expenditures is projected to exceed that of revenues by even more than was the case in Foot, *et al.* (1977). Consequently, as projected, net cash requirements would rise from 11 per cent of total expenditures in 1977 to 17 per cent in 1982 and 26 per cent in 1987. For the latter two years the corresponding percentages in Foot, *et al.* (1977) were 14 and 25.

As noted in section 4.4 above, the projected growth rate for TEIA is implausibly high. Expenditures other than TEIA are projected to grow at an average annual rate of 12.4 per cent over the first half of the decade to 1987 and at an average annual rate of 12.5 per cent over the last half. If projected values for TEIA were replaced by the assumption that growth paralleled these rates, the implications for TEIA Total Expenditure and the growth rates in the latter would be as set forth in Table 4.6.

Table 4.6 also presents the implications for total revenues of an alternative adjustment procedure. On balance, the equations employed over-estimated revenues by about 9 per cent in relation to the Revised Estimates for 1977-78. The method of proportionate adjustment scales revenues down by roughly this same factor throughout the projection period. An alternative adjustment procedure, employed in Foot, *et al.* (1977), would just reduce revenues by the amount of the 1977 reduction in all years. The implications for net cash requirements of this alternative procedure together with the alternative assumption concerning TEIA are also set forth in Table 4.6.

The value for net cash requirements in Table 4.6 is about the same as that in Foot, *et al.* (1977) for 1982 but only 2/3 as great for 1987. Even on these alternative assumptions, then, the implications for net cash requirements raise an essential question, which lies beyond the scope of this study.

The question is: 'Can the dramatic slowdown in rate of growth of expenditures from almost 25 per cent to 8 per cent per annum over a four-year period be sustained?' It represents a substantial departure from historically evolving trends. The determination of the Government of Ontario to 'exercise restraint', i.e., to curb the rate of growth of expenditures arising from institutional arrangements entered into in previous years, whatever else might be said of it, has rendered 'invalid' the estimating equations over this recent period.

There is no way expenditure equations estimated on the basis of historical patterns can be expected to capture such a policy change. As stated at the outset of this chapter, the projections are very much conditional, and should not be interpreted as a 'best-forecast'. They essentially project the logical outcome of processes that were established over a number of years. With respect to the recent past, for example, the role of the estimating equations and the projections generated from them is to show how things would have turned out had it not been for the policy changes, and perhaps thereby make these policy changes more readily understood.

It remains to be seen whether the policy of restraint is viable in the longer-run, or whether the pressures for expenditure will burst the recently

imposed bonds. The expenditure projections implicitly assume the latter.

4.6 ADDITIONAL SOLUTIONS

The additional solutions described in Chapter 2 have effects on projected Ontario Government revenue and expenditures and net cash requirements as reported herein.

4.6.1 Effect on Total Ontario Government Revenue

The effect of each additional solution on Total Ontario Government Revenue is set forth in Table 4.7. Positive impact effects are greatest for increased Federal Government expenditures and increased money supply. These are still strongest in the long run, but increased business investment has a substantial positive influence as well. Negative impact effects are greatest for increased capital inflow and next greatest for devaluation of the Canadian dollar and improved labour market structure. The latter also has the greatest long-run effect, with increased exports and increased capital inflow close seconds.

4.6.2 Effect on Total Ontario Government Expenditure

The effect of each additional solution on Total Ontario Government Expenditure is set forth in Table 4.8. Positive impact effects are greatest for increased Federal Government Expenditures and increased money supply. Long-run positive effects are also greatest for these two, but there are three close contenders: increased business investment, the personal income tax reduction and the sales tax reduction. The negative impact effect is greatest for improved labour market structure, followed by increased capital inflow. Long-run negative effects are also greatest for these two, although increased exports also become influential.

4.6.3 Effect on Ontario Government Net Cash Requirements

The effect of each additional solution on Ontario Government Net Cash Requirements is portrayed in Table 4.9. Positive impact effects are greatest (and virtually identical, by design of the experiments) for reductions in the personal

income tax and the sales tax. Although these also have substantial long-run positive effects, they are rivalled by increased business investment and increased money supply and outdistanced by increased Federal Government expenditures. The biggest negative impact effect is that for improved labour market structure followed by increased money supply. In the long run, however, the effect of the latter is substantially positive. Improved labour market structure is the only additional solution with a strong negative effect in the long run, while increased capital inflow ranks second in importance.

4.6.4 Effect on Ontario EPF Payments from the Federal Government

Payments from the Federal Government in this update consist of two components. Existing Program Financing (EPF) Payments under the new federal-provincial fiscal arrangements are modelled explicitly as described in Appendix 4.1. The remainder is assumed to remain constant in real per capita terms at the 1977 level.

The effect of each additional solution on Ontario EPF Payments from the Federal Government is set forth in Table 4.10. Because of the lags involved, there is no effect at all for 1979, and only a gradual buildup over the year. The greatest positive responses follow increased Federal Government expenditures and increased money supply, with increased business investment of intermediate influence. The tax cuts have almost identical effects, while devaluation of the Canadian dollar leads to the smallest final response. Increased exports and increased capital inflow have about the same negative effect as the tax cuts have positive effect. Improved labour market structure has about the same negative effect as the increased money supply has positive effect.

Table 4.7

EFFECT ON TOTAL ONTARIO GOVERNMENT REVENUE

	1979	1980	1981	1982	1983	1984	1985	1986	1987
Reference solution level (\$ million)	15068	16727	18558	20546	22860	25196	27860	30796	34066

percentage difference^a

Additional solution

1. Devaluation of the Canadian dollar	1.21	1.59	1.93	2.24	2.47	2.69	2.85	2.96	3.04
2. Increased exports	-0.76	-0.92	-1.13	-1.46	-1.89	-2.42	-3.00	-3.63	-4.42
3. Increased capital inflow	-1.92	-2.00	-2.15	-2.45	-2.85	-3.32	-3.78	-4.18	-4.67
4. Improved labour market structure	-1.28	-1.56	-2.09	-2.84	-3.83	-5.01	-6.37	-7.88	-9.75
5. Increased business investment	1.00	1.49	1.96	2.47	3.08	3.87	4.78	5.80	6.94
6. Personal income tax reduction	-0.48	-0.16	0.20	0.62	1.14	1.83	2.67	3.71	4.94
7. Sales tax reduction	-0.25	-0.01	0.32	0.70	1.18	1.80	2.55	3.44	4.51
8. Increased federal government expenditure	1.91	2.23	2.77	3.69	4.86	6.14	7.85	9.64	11.88
9. Increased money supply	2.37	2.37	2.84	3.46	4.24	5.23	6.28	7.41	8.76

a Additional solution minus reference solution as a per cent of the latter.

Table 4.8

EFFECT ON TOTAL ONTARIO GOVERNMENT EXPENDITURE

	1979	1980	1981	1982	1983	1984	1985	1986	1987
Reference solution level (\$ million)	17334	19491	22063	24804	27954	31631	35971	40719	46234

percentage difference^a

Additional solution

1. Devaluation of the Canadian dollar	0.75	1.27	1.76	2.20	2.58	2.89	3.14	3.35	3.50
2. Increased exports	-0.31	-0.56	-0.76	-1.00	-1.34	-1.79	-2.33	-2.96	-3.73
3. Increased capital inflow	-1.19	-1.70	-2.09	-2.45	-2.90	-3.39	-3.90	-4.40	-4.95
4. Improved labour market structure	-2.51	-2.89	-3.59	-4.40	-5.46	-6.69	-8.12	-9.75	-11.69
5. Increased business investment	0.64	1.56	2.42	3.26	4.14	5.09	6.12	7.27	8.52
6. Personal income tax reduction	0.79	1.39	1.96	2.54	3.20	3.96	4.86	5.96	7.27
7. Sales tax reduction	0.97	1.44	1.93	2.42	2.99	3.66	4.44	5.39	6.51
8. Increased federal government expenditure	2.15	2.70	3.46	4.59	6.02	7.41	9.37	11.36	13.76
9. Increased money supply	1.47	2.13	2.88	3.64	4.55	5.59	6.74	8.00	9.45

a Additional solution minus reference solution as a per cent of the latter.

Table 4.9

EFFECT ON ONTARIO GOVERNMENT NET CASH REQUIREMENTS

	1979	1980	1981	1982	1983	1984	1985	1986	1987
Reference solution level (\$ million)	2266	2763	3506	4258	5094	6435	8110	9923	12168
	difference (\$ million) ^c								
Additional solution									
1. Devaluation of the Canadian dollar	-53	-18	31	84	154	235	338	452	584
2. Increased exports	62	44	42	52	57	45	-3	-87	-222
3. Increased capital inflow	83	4	-61	-105	-160	-237	-352	-506	-697
4. Improved labour market structure	-243	-303	-404	-509	-652	-854	-1145	-1544	-2085
5. Increased business investment	-40	55	171	301	454	635	870	1173	1577
6. Personal income tax reduction	209	297	395	502	634	792	1005	1287	1677
7. Sales tax reduction	207	282	367	456	566	702	888	1137	1476
8. Increased federal government expenditure	84	152	250	381	572	799	1183	1656	2315
9. Increased money supply	-102	19	109	191	303	450	673	976	1382

c Additional solution level minus reference solution level.

Table 4.10

EFFECT ON ONTARIO EPF PAYMENTS FROM THE FEDERAL GOVERNMENT

	1979	1980	1981	1982	1983	1984	1985	1986	1987
Reference solution level (\$ million)	1530	1698	1904	2133	2385	2660	2964	3303	3681

percentage difference^a

Additional solution

1. Devaluation of the Canadian dollar	0.0	0.4	0.8	1.5	1.7	2.0	2.2	2.4	2.5
2. Increased exports	0.0	-0.2	-0.6	-0.9	-1.1	-1.4	-1.8	-2.2	-2.8
3. Increased capital inflow	0.0	-0.6	-1.3	-1.9	-2.1	-2.3	-2.6	-3.0	-3.3
4. Improved labour market structure	0.0	-0.3	-0.7	-1.3	-1.8	-2.4	-3.2	-4.3	-5.5
5. Increased business investment	0.0	0.4	0.8	1.5	1.9	2.4	3.0	3.7	4.5
6. Personal income tax reduction	0.0	0.3	0.6	1.0	1.3	1.6	2.1	2.5	3.3
7. Sales tax reduction	0.0	0.3	0.6	1.0	1.2	1.5	2.0	2.5	3.1
8. Increased federal government expenditure	0.0	0.6	1.3	2.1	2.6	3.3	4.3	5.5	6.9
9. Increased money supply	0.0	0.8	1.5	2.4	2.8	3.3	4.0	4.9	5.8

a Additional solution minus reference solution as a per cent of the latter.

Appendix 4.1

METHODOLOGY OF PROJECTING ONTARIO GOVERNMENT REVENUE AND EXPENDITURE

The methodology of projecting Ontario Government revenues and expenditure is set forth fully in the Appendix to Chapter Five of Foot, *et al.* (1977). As indicated therein, the basic data series and equation specification used in estimation were derived from the pioneering work of Foot (1975 and 1977).

The structure of this update differs in several respects. The most important relates to the new federal-provincial fiscal arrangements. The personal income tax rate has been increased to 44 per cent of the federal basic income tax for 1977 and subsequent years. As we understand it, the new arrangements do not alter the elasticity of personal income tax receipts in Ontario. In the presence of indexing, the elasticity of receipts with respect to pure price inflation should be about unity. The elasticity with respect to increases in real personal income will be somewhat greater because of the progressivity in the federal personal income tax rate structure. The rate of growth in projected personal income tax revenues for Ontario is pretty much in line with projected rates of growth for such receipts nationally.

Concomitant with this increased 'tax room', goes a new formula for 'Established Programs Financing' (EPF). Consequently, the equation used to project Payments from the Federal Government in Foot, *et al.* (1977) has been supplanted. In accordance with the Appendix to Budget Paper B of the Ontario Budget 1977, the EPF part of Payments from the Federal Government has been re-specified as follows:

$$\begin{aligned} \text{EPF}_{77} &= 136.52 * \text{TXESC}_{77} * \text{OPOP}_{77} && \text{for 1977 only and} \\ \text{EPF}_t &= \left(\frac{\text{EPF}}{\text{OPOP}} \right)_{t-1} * \text{TXESC}_t * \text{OPOP}_t && \text{for 1978 and beyond.} \end{aligned}$$

where OPOP is Ontario population and TXESC is the "escalator which represents the average increase in gross national product per capita over the past three years (which) - for the first time enshrines the cube root as a part of federal legislation".¹

$$TXESC_t = [(GNPV_{t-1} * POP_{t-4}) / (POP_{t-1} * GNPV_{t-4})]^{1/3}$$

The values of this escalator published in the Ontario Budget 1977 were based upon data which were subsequently revised. The base contribution for fiscal year 1975-76 cited in that publication, escalated by the revised value of the escalator (1.1460) amounts to \$238.02 and half of this or \$119.01 represents the basic cash contribution for 1976-77 before escalation. In addition, starting in 1977-78, the Federal Government agrees to pay each province \$20 per capita in respect of sundry health care services. Subsequently, this payment is to be adjusted by the escalator described above. For convenience in modelling, the \$20 per capita has been deflated by the 1977 value of the escalator (to yield \$17.50) and added to the \$119.01 basic cash figure cited above to derive the \$136.52 figure in the EPF equation. The remainder of Federal Government Payments is assumed to remain constant in real per capita terms at the 1977 level.

The new federal-provincial fiscal arrangements also have implications for those estimated equations in Foot (1977) which included payments from the Federal Government as an explanatory variable. It was the implication of these equations that the availability of federal funds to a designated field such as health, education or social services facilitated the growth of expenditures in these areas. It seems to be the intention in part of the new federal-provincial fiscal arrangements to detach this linkage. Accordingly in the equations involved, federal funds have been held constant at the estimated 1976 levels, thus depriving the relevant expenditure categories of any impetus from this apparent former source.

Also, the weighted average rate on vehicle registrations has been increased from \$36.8 to \$54.0 to reflect the changes in the April, 1977 Budget.

1 David B. Perry, "The Federal-Provincial Fiscal Arrangements Introduced in 1977," *Canadian Tax Journal*, July-August, 1977.

Finally, the method of incorporating the 'adjustments' to individual equations has been modified. With respect to revenues, whereas in Foot, *et al.* (1977) the absolute values of such adjustments were extended throughout the projection period, in this update proportional values of such adjustments have been so extended. The implications of this change were discussed in section 4.5 of the text. With respect to expenditures, whereas in Foot, *et al.* (1977) such adjustments were confined to the initial solution year for all equations involving lagged values of the dependent variable, in this update the adjustments are designed to alter the equilibrium value by this absolute amount. In the case of TEIA, because of the attempted re-classification to All Other Budgetary and Non-Budgetary Expenditures, the adjustments have been carried forward throughout the projection period, in an attempt to build in a 'permanent' change in the values forecast by the equations involved. As indicated in the text, the projected rates of growth for TEIA, so adjusted, nevertheless remained implausibly high.

Table A4.1

ONTARIO REVENUE REVISIONS, 1976-77
(millions of dollars)

	<u>Revised Outlook</u> ¹	<u>Projection</u> ²
Personal Income Tax	-148	75
Corporate Income Tax	-95	-295
Retail Sales Tax	-50	-212
Motive Fuel Tax	-10	-3
Other Taxation	23	152
	<hr/>	<hr/>
Total Taxation Revenue	-280	-283
 OHIP Premiums	 0	 0
LCBO Profits	-20	-64
Vehicle Registration Fees	-3	-12
Other Fees and Licences	-3	88
Miscellaneous Other Revenue	3	21
	<hr/>	<hr/>
Total Other Revenue	-23	33
 Payments from Federal Government	 46	 -92
Interest on Investments	7	-178
	<hr/>	<hr/>
Total Budgetary Revenue	-250	-520
 Total Non-Budgetary Revenue	 38	 -67
	<hr/>	<hr/>
Total Revenue	-212	-587

1 Interim value per Ontario Budget 1977 minus value per Ontario *Finances* (1976).

2 Interim value per Ontario Budget 1977 minus projected value per Foot, *et al.* (1977).

Appendix 4.2

SOME NOTES ON THE 1976-77 FISCAL YEAR

When the projections in Foot, *et al.* (1977) were made, values calculated from the equations for total revenues and expenditures were essentially accurate for fiscal year 1975-76. It was therefore only necessary to make adjustments among categories. In Table 5.8 of that report, projected values for fiscal 1976-77 (reflecting the distributional adjustments for 1975-76) were compared with 'revised outlook' values available at the time of writing. Projected revenues appeared to be about 3 1/3 per cent high and projected expenditures about 4 1/2 per cent high compared to the 'revised outlook' values.

The 'revised outlook' value for revenue itself was subsequently revealed to have been about 2 per cent on the high side compared to the 'Interim' value for 1976-77 published in Ontario Budget 1977. However, the 'revised outlook' value for expenditure was high by only 1/2 per cent. Thus the apparent *net* pessimistic bias in the projection in Foot, *et al.* (1977) for fiscal 1976-77 was confirmed by the 'Interim' results. Some of the upward bias on the expenditure side is due to the inability of equations estimated on the basis of historical developments to reflect dramatic innovations in policy stance.

Table A4.1 sets forth the detail on the revenue revisions referred to above. Although the projection overstated Total Taxation Revenue by little more than the 'Revised Outlook' it was much less consistent among categories, substantially overestimating Corporate Income Tax and Retail Sales Tax receipts, and underestimating Other Taxation and to a lesser extent Personal Income Tax. Interest on Investments was also substantially overstated. Foot (1977) did not estimate equations for Other Taxation, Interest on Investments, Non-Budgetary Revenue or Payments from the Federal Government. The equations in Foot, *et al.* (1977) related all but the latter to Gross Provincial Product and Provincial population as an alternative to an otherwise exogenous choice of values.

Table A4.2

ONTARIO EXPENDITURE REVISIONS, 1976-77
(millions of dollars)

	<u>Revised Outlook</u> ¹	<u>Projection</u> ²
Health	-24	15
Education	8	-89
Transportation and Communications	-55	-156
Community and Social Services	-16	-7
Public Debt-Interest	-3	-105
Other ³	<u>29</u>	<u>-281</u>
Total Expenditures	-61	-623

1 Interim value per Ontario Budget 1977 minus value per Ontario *Finances* (1976).

2 Interim value per Ontario Budget 1977 minus projected value per Foot, *et al.* (1977).

3 Treasury, Economics and Intergovernmental Affairs combined with All Other Budgetary and Non-budgetary Expenditures because of differences in basis of reporting.

Table A4.2 sets forth the detail on the expenditure revisions referred to above. As already mentioned, the 'Revised Outlook' values underwent relatively little subsequent revision. The projections were reasonably accurate for Health, Community and Social Services, and, to a lesser extent, Education but in general were too high. Over 60 per cent of the total overestimation in the projection is accounted for by Public Debt Interest and 'Other'. The former, and the TEIA part of the latter are based on the equations of Foot (1977) which extrapolate past high rates of growth. All Other Budgetary and Non-Budgetary Expenditures were simply assumed in Foot, *et al.* (1977) to grow in line with Gross Provincial Product, essentially an assumption of exogeneity.

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